

DOCUMENT RESUME

ED 184 949

SO 012 483

AUTHOR Thorndyke, Perry W.; Stasz, Cathleen
 TITLE Training Procedures for Map Learning.
 INSTITUTION Rand Corp., Santa Monica, Calif.
 SPONS AGENCY Office of Naval Research, Washington, D.C. Personnel
 and Training Branch.; Office of Naval Research,
 Washington, D.C. Psychological Sciences Div.
 REPORT NO Rand-N-1018-ONR
 PUB DATE Jul 79
 CONTRACT NO0014-78-C-0042: NR-157-410
 NOTE 50p.: For related documents, see SO 012 482.
 AVAILABLE FROM The Rand Corporation, 1700 Main Street, Santa Monica,
 CA 90406 (\$5.00)

EDRS PRICE MF01/PC02 Plus Postage.
 DESCRIPTORS Cognitive Objectives; *Cognitive Style; *Educational
 Practices; *Educational Research; Higher Education;
 *Learning Processes; Locational Skills (Social
 Studies); *Map Skills; Postsecondary Education;
 *Skill Development; Task Analysis

ABSTRACT

This paper discusses a study to determine the influence of study procedures on success at map-learning tasks. The hypothesis was that subjects who used certain (effective) learning procedures would perform better than subjects who stressed other (less effective) techniques. The effective procedures set comprised techniques for learning spatial information, using self-generated feedback to guide subsequent study behavior, and partitioning the map into sections. The less effective procedures set comprised subjects' random learning techniques, random sampling, and unrestricted focus of attention. Methodology involved directing 43 college students to learn and reproduce maps according to their own techniques. Subjects were then divided into three groups and instructed to participate in a second map-learning task in which they used 1) procedures previously determined as effective learning aids, 2) procedures unrelated to learning success, or 3) their own learning techniques. Findings from a comparison of performance on the first and second map-learning task indicated that performance improvement was directly related to the frequency with which subjects used procedures designated as most effective learning aids. The conclusion is that students can improve learning effectiveness and performance of complex tasks such as map learning if they use procedures designated as effective learning aids. (DB)

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N-1018-ONR

July 1979

TRAINING PROCEDURES FOR MAP LEARNING

Perry W. Thorndyke and Cathleen Stasz

A Rand Note

prepared for the

OFFICE OF NAVAL RESEARCH

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This research was sponsored by the Personnel and Training Research Programs, Psychological Sciences Division, Office of Naval Research, under contract No. N00014-78-C-0042, Contract Authority Identification Number, NR-157-410.

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Published by The Rand Corporation

PREFACE

This study is the second in a series of Rand investigations of the process of map learning. The work reported here was performed between September and December 1978 and was supported by the Personnel and Training Research Programs of the Office of Naval Research. Additional research in this area is continuing and will be documented in subsequent reports.

SUMMARY

This study investigated the influence of subjects' high-level study procedures on their success at learning a map. After learning a map using their own techniques, subjects were instructed (a) in the use of six previously determined effective learning procedures, (b) in the use of six procedures unrelated to learning success, or (c) to continue using their own techniques. The effective-procedures set comprised three techniques for learning spatial information, two techniques for using self-generated feedback to guide subsequent study behavior, and a procedure for partitioning the map into sections. On a second map-learning task, subjects trained to use effective procedures improved their performance significantly more than subjects in the other two groups. The magnitude of the performance increment was a function of the frequency with which these subjects used the designated procedures. In addition, both subjects' map-learning performance and subjects' use of spatial learning procedures were predictable from a psychometric measure of visual memory ability. These findings suggest that high-level procedures and low-level processing skills play complementary roles in determining complex task performance.

ACKNOWLEDGMENTS

We gratefully acknowledge the assistance of Rick Hayes-Roth, who commented on earlier drafts of this Note, and Barbara Hayes-Roth, who contributed helpful advice throughout the course of the research.

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I. INTRODUCTION

Individual differences among learners constitute an important source of variation in many learning and memory tasks. One source of individual differences often studied by educational psychologists is the variation in the basic skills required to perform the experimental task (Snow, 1976; Cronbach & Snow, 1977). Researchers have recently begun to consider another potential source of differences in complex task performance: the procedures that subjects use to perform the task (e.g., Johnson, 1978; MacLeod, Hunt, & Mathews, 1978). In a study of map learning, Thorndyke and Stasz (1979) found that successful learners differed from poor learners in the high-level processing procedures they used when attempting to learn a map. Several of the procedures used primarily by good learners required them to encode spatial configurations of information from the map. This suggested the possibility that spatial ability, not procedure selections, might underlie the observed individual differences in performance. The hypothesis that abilities, not procedures, primarily account for individual differences has received support in studies of short-term retention in other paradigms (Huttenlocher & Burke, 1976; Cohen & Sandberg, 1977; Lyon, 1977).

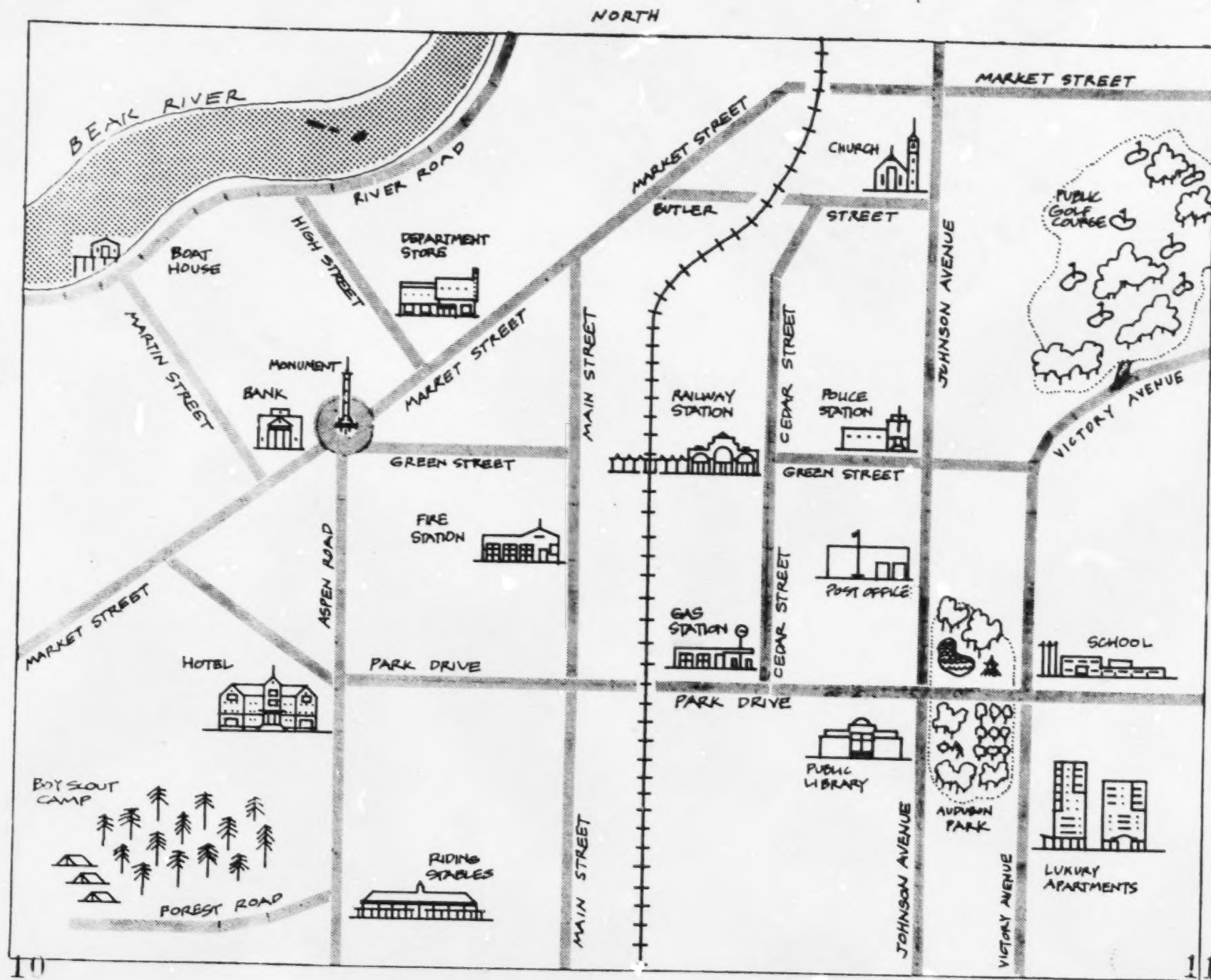
In the present study, we investigate the hypothesis that subjects can significantly improve their map-learning performance, independent of their basic abilities, by using effective processing procedures. By training subjects in the use

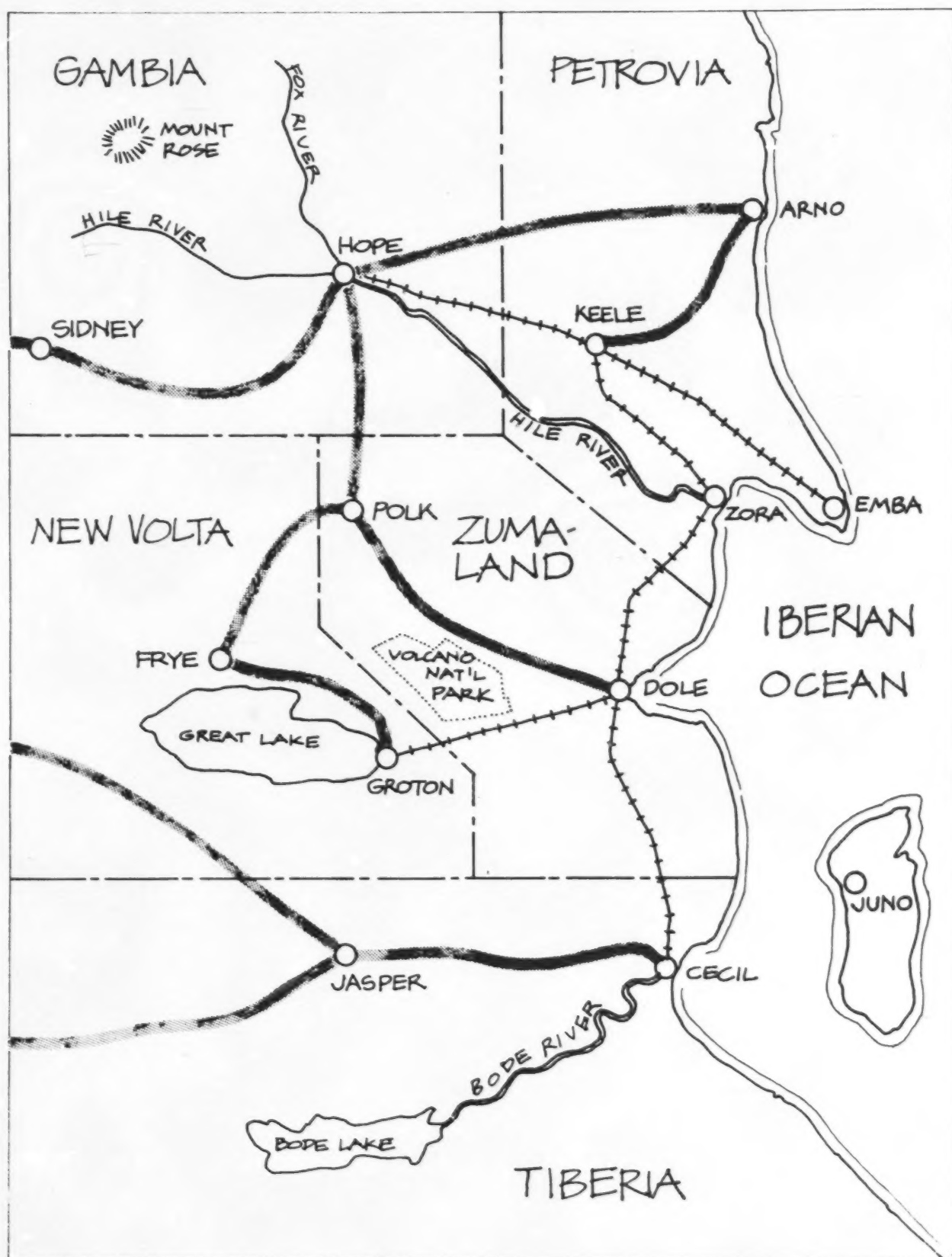
of certain processing procedures correlated with success in the earlier study (Thorndyke & Stasz, 1979), we hoped to improve their performance over that of subjects of equivalent abilities using self-selected procedures. Since the results of the earlier study guided our selection of procedures for the present study, we briefly summarize the results of that experiment here.

To identify the procedures subjects use to learn a map, we analyzed verbal protocols of subjects who were trying to memorize two maps. Subjects were either experienced or novice map users. They studied a map for two minutes, during which time they provided verbal protocols describing what information they were focusing on and the procedures they were using to learn that information. After the study period, subjects drew as much of the map as they could remember. Six such study-recall trials were provided on each of two maps (shown in Figures 1 and 2).

Analysis of subjects' protocols and recall performance revealed that a variety of performance differences could be traced to differences in processing procedures. Good learners frequently used procedures that were rarely used by poor learners. Success depended more on the use of particular procedures than on subjects' prior experience using maps. Experienced map users were either successful or unsuccessful map learners, depending on the procedures they adopted during study. Table 1 shows the correlations between the frequency of use of selected procedures and the percentage of map elements correctly recalled, averaged across maps. A map element corresponded to

Figure 1. Town Map





the name plus location of a single conceptual entity, such as a building, a road, a river, or a country.

Table 1
Correlations between Strategy Use and Recall
(after Thorndyke & Stasz, 1979)

Strategy	Correlation with Recall
Imagery	.66 *
Evaluation of unlearned information	.61 *
Relation encoding	.57 *
Rehearsal	.54 *
Pattern encoding	.50 *
Memory-directed sampling	.46 *
Partitioning	.31
Labeling	.14
Mnemonics	-.17
Association	-.29

* $p < .05$

We supplemented these correlational data by contrasting the learning protocols of good learners and poor learners. We defined good learners as subjects who recalled at least 90% of the map elements correctly by the last trial. By comparing the protocols from the two groups, we isolated six seemingly effective procedures: partitioning, memory-directed sampling, imagery, pattern encoding, relation encoding, and evaluation. Because these six procedures play an important role in the present study, a brief description of each follows.

Partitioning is a procedure for focusing attention on a subset of the map information. Since each map contained too much information to be learned on any one trial, some learners defined meaningful subsets of the information on which to focus attention. Subjects partitioned the map in two ways: by attending only to elements in a particular spatial region (e.g., the northwest corner of the map) or by attending only to elements in a particular conceptual category (e.g., streets).

A subject using memory-directed sampling would construct a mental list of the information that was not recalled during a given recall attempt. On the next study trial, the subject would immediately search for and study that unlearned information.

Imagery involved the construction in memory of a visual image of some portion of the map. For example, subjects might form a mental image of the shape of the coastline in the map shown in Figure 2. Subjects would often exhibit the use of this procedure by closing their eyes or by looking away from the map during the study period.

Pattern encoding required the explicit encoding of a spatial detail or shape of a single map element. For example, a subject might notice that a road curved to the north halfway along its length.

The relation encoding procedure was used to encode detailed spatial relationships between two or more objects. For example, a subject might encode the location of a building as a particular street intersection or notice that two streets were parallel.

Subjects' use of evaluation involved monitoring their learning progress by considering what information they had already learned and what still needed to be studied. Good learners primarily focused attention on and evaluated unlearned elements, ignoring that information they had already learned. The procedure shown in the second row of Table 1 represents the percentage of all evaluation statements that concerned as-yet-unlearned, rather than already learned, map elements.

In sum, good learners structured the learning task by defining and systematically studying subsets of information from the map (partitioning and memory-directed sampling). They used encoding procedures that were particularly adaptive for learning spatial information (imagery, pattern encoding, relation encoding). Finally, they evaluated their learning progress consistently and accurately, using the outcome of those evaluations to guide their study behaviors (evaluation, memory-directed sampling).

While these high-level processing procedures were correlated with learning outcomes, such procedures are but one of several potential sources of individual differences on this task. It is not clear what role the use of these procedures alone plays in learning. While some studies have shown that learning can be improved through the use of such procedures as imagery (Paivio, 1971; Rohwer, 1973) or chunking (Bower & Winsenz, 1969; Belmont & Butterfield, 1971; Hunt & Love, 1972; Estes, 1974), other studies

have demonstrated that individual differences remain even when such procedures are precluded (Huttenlocker & Burke, 1976; Lyon, 1977).

Hunt (1978) has proposed that individual differences in cognition arise from three sources: differences in the use of simple processing procedures, differences in knowledge related to or about the task, and differences in the low-level mechanics of information processing. Differences in subjects' profiles of procedure use clearly differentiated good from poor learners in the Thorndyke and Stasz (1979) study. On the other hand, the failure of experienced map users to perform consistently better than novice map users suggests that knowledge about maps was not a source of performance differences. The third source of individual variation, the mechanics of information processing, refers to basic operations performed on the physical representation of a symbol. These operations are presumed independent of the information denoted by the symbol. Such operations include decoding, visualization, selective filtering, memory retrieval, and memory comparison. Numerous studies have demonstrated individual differences in these operations on a variety of tasks (e.g., Hunt, Frost, & Lunneborg, 1973; Hunt, Lunneborg, & Lewis, 1975; Cohen & Sandberg, 1977; Lyon, 1977; Goldberg, Schwartz, & Stewart, 1977).

Thorndyke and Stasz did not measure these operations directly, but it seems reasonable to assume that subjects differed in their abilities to carry out these processes.

Differences at this level of processing typically impact on high-level procedure choices (MacLeod, Hunt, & Mathews, 1978). For example, on the map-learning task, subjects differing in self-reported visualization ability employed different procedures. The best map learner stated that he had good visual memory and frequently constructed visual images to learn and remember information. By contrast, the worst learner reported that he had very poor memory for spatial information and had never experienced having mental images. This learner used primarily verbal procedures and did not attempt to learn the more complex spatial configurations on the maps. Furthermore, in another study of map learning (Stasz & Thorndyke, 1979), two psychometric measures (visual memory ability and field-dependence) correlated highly with both performance on the task and the use of strategies that depended on visual and spatial-analytical processing.

These studies suggest that both higher-level procedure choices and basic processing abilities contribute to differences among individuals. The present study was designed to investigate whether subjects could be trained to use a set of successful processing procedures for learning information from maps and whether such training alone would significantly improve their performance. The set of "effective" techniques comprised three procedures for learning spatial information (imagery, pattern encoding, relation encoding), two procedures for using self-generated feedback to guide subsequent study behaviors (memory-directed sampling, evaluation), and a procedure for dividing the learning problem into subproblems (partitioning).

To contrast training in the use of effective procedures with the effects of instruction per se, we included subjects who received training on six procedures uncorrelated with performance in our previous study. These procedures were mnemonics, labeling, rehearsal, and three association procedures. Correlations between performance and the use of these procedures are presented in Table 1. The mnemonic procedure requires the creation of an acronym to represent the names of several map elements. For example, "SHAK" is a mnemonic for the city names of Sidney, Hope, Arno, and Keele on the Countries Map. The labeling procedure requires the generation of a concept or name for a complex spatial configuration as a cue for recall. For example, a subject might notice that the coastline on the Countries Map forms the profile of a face. The rehearsal procedure entails the repetition of a set of names or location descriptions. In the previous study (Thorndyke & Stasz, 1979), one good learner rehearsed the names of the map elements while imaging the spatial relationships of those elements. This combined use of rehearsal and imagery produced the high correlation between rehearsal and recall shown in Table 1. In a subsequent study (Stasz & Thorndyke, 1979), rehearsal was unrelated to performance. The three association procedures establish conceptual relations between two or more map elements. The first association procedure consists of creating a link between some map information and some related prior knowledge. For example, the subject might notice that Market Street on the Town Map is

spatially similar to Market Street in San Francisco. A second type of association relates two or more objects from the map, using some additional world knowledge. For example, one might link Victory Avenue with the adjacent golf course through the association "Victory at golf." A third use of this general procedure requires the creation of a narrative or scenario incorporating several map elements (e.g., "The BUTLER went to CHURCH and saw CEDAR trees in the PARK."). Since these procedures were uncorrelated with success in our prior studies, training subjects to use them should not affect their performance.

We also assessed the visual memory ability of subjects using the Building Memory test from the Kit of Factor-Referenced Cognitive Tests (Ekstrom, French, & Harmon, 1976). This test measures subjects' ability to remember the configuration, location, and orientation of spatial information in a complex display. If visual memory accounts for much of the variation in learning, or if it is a prerequisite for using high-level procedures, then training should have little effect on performance.

II. METHOD

MATERIALS

The Town Map, shown in Figure 1, served as the pre-training experimental material. It contained a river, streets, buildings, parks, and other landmarks typically found in a small town. All of these map elements except the railroad tracks had verbal labels or names associated with them. The Countries Map, shown in Figure 2, served as the post-training test material. It differed from the Town Map in both scale and content. This map portrayed countries, cities, roads, railroads, and prominent terrain features, such as an ocean, an island, rivers, lakes, and a mountain. Roads and railroads had no verbal labels, but all other map elements were named. In constructing these maps we attempted to include a variety of types of map information and to make the maps as natural as possible. A third map, adapted from a study by Shimron (1975), was used by subjects during training to practice their learning procedures. This County Map depicted an imaginary county containing roads, cities, a river, and mountains.

SUBJECTS

Forty-three subjects participated in the study. Thirteen were Santa Monica Community College students who were paid \$3.50 per hour. Thirty subjects were UCLA undergraduates who participated in order to fulfill a course requirement.

DESIGN

Subjects were randomly assigned to either the control group or one of two training groups. The Effective Procedures group (n=14) received instruction on six procedures correlated with successful learning in our previous studies. These procedures were partitioning, imagery, pattern encoding, relation encoding, memory-directed sampling, and evaluation. The Neutral Procedures group (n=16) received instruction on six procedures that were previously uncorrelated with performance: mnemonics, spatial labeling, rehearsal, and three association procedures. The No Procedures group (n=13) received no training.

PROCEDURE

Within each treatment condition subjects were tested in groups. They were told that the study investigated the effectiveness of certain procedures for learning maps and that their task was to learn, using any techniques they knew, the map they would be shown. Each subject was then given a copy of the Town Map to study. After two minutes the map was withdrawn and subjects were instructed to draw as much of the map as they could remember. Recall time was limited to seven minutes. Three study-recall trials, administered in this manner, served as a pretest of map learning.

Following these trials, each group received different instruction on the use of learning techniques. For the Neutral and Effective Procedures groups, the experimenter described each

of the respective procedures for that group in detail. Instructions for the use of the evaluation procedure emphasized, in addition to the technique itself, the advantages of accuracy, attention to unlearned elements, and subsequent study of those elements. The experimenter illustrated the use of each procedure with examples on the Town Map. Subjects studied these examples on their own copies of the map.

Subjects in the No Procedures group were instructed to continue using their own learning techniques on the next maps. In addition, the experimenter provided some general suggestions for improving performance on subsequent maps. She urged subjects (a) to concentrate on the task and not to be distracted, (b) to evaluate the effectiveness of the techniques they were using, (c) to discontinue using any techniques that appeared to be ineffective, and (d) to try to learn as much as possible in the time provided. For all three groups, this training session lasted between 20 and 30 minutes.

Subjects were then given copies of the County Map and instructed to practice the techniques that they had been taught. Two trials, consisting of two minutes of study and five minutes for recall, were provided. Following these practice trials, the experimenter reviewed the learning procedures and answered any questions about their use. Subjects were then given copies of the Countries Map and instructed to use the techniques they had been taught whenever possible. Subjects alternately studied and

reproduced the map on five study-recall trials. Two minutes were provided for each study trial, seven minutes for recall.

After the last recall trial, subjects completed two questionnaires reporting the procedures they used during study. Each questionnaire comprised 16 questions, each of which required subjects to indicate the frequency with which they used a particular procedure. Nine of the 16 questions referred to the effective learning procedures, and six questions referred to the neutral procedures. One question referred to a procedure not in either set. For each question, a statement describing the procedure was followed by an example of its use on the appropriate map. Subjects rated how often they used the procedure on a scale ranging from "0" (never used the procedure) to "6" (used procedure on every trial). Figure 3 illustrates a procedure question for each map. Question 1 refers to the partitioning procedure, Question 2 to one of the association procedures. Subjects consulted their maps while answering all questions. Following completion of the questionnaire, subjects took the psychometric test of visual memory ability. Total training and testing time for each group was approximately two and one-half hours.

- 1) I divided the map into smaller sections or parts and concentrated on learning the information in each smaller part.

Example: Tried to learn all the information located in the area above Market Street in the northwest corner of the map.

Circle the number which indicates whether or not and how often you used this strategy.

0	1	2	3	4	5	6
NEVER	ONCE/ONE TRIAL	OCCASION- ALLY	FREQUENTLY	MOST OF THE TIME	EVERY TRIAL	

- 2) I tried to learn certain information by associating it in some way to my experience or to other facts that I know.

Example: The map reminded me of Africa. There is a country in Africa called Zambia, which is similar to Gambia.

Circle the number which indicates whether or not and how often you used this strategy.

0	1	2	3	4	5	6
NEVER	ONCE/ONE TRIAL	OCCASION- ALLY	FREQUENTLY	MOST OF THE TIME	EVERY TRIAL	

Figure 3. Examples of Strategy Questions for the Town Map and the Countries Map

III. RESULTS AND DISCUSSION

Each map that subjects recalled was scored for percent correct reproduction of map elements (e.g., buildings, roads, countries, lakes, parks, etc.). An element could have two attributes: a spatial location and a verbal label. The Town Map contained 33 elements, all but one of which were labeled. The Countries Map contained 43 elements, 26 of which had names and 17 of which were unlabeled. The County Map was used only for practice and was not scored for recall.

Recall of spatial and verbal information was scored separately using the decision rules described in Thorndyke and Stasz (1979). For each subject, the proportions of verbal attributes, spatial attributes, and entire elements correctly recalled were computed for each trial. An overall score for each map was obtained by computing the mean across recall trials. Scores for the Town Map represent the mean recall across three learning trials; scores on the Countries Map represent recall across five trials.

PRE-TRAINING PROCEDURE USE

We were first interested in the relationship between procedure use and learning performance before training. Therefore, we divided the 43 subjects into good and poor learners based on performance on the first map. We defined good learners as subjects whose last trial recall was at least 45% and whose

mean recall across trials was at least 34%. Poor learners all had last-trial performance of less than 40% and mean recall of less than 32%. These criteria produced a group of 20 good learners and a group of 20 poor learners. Three subjects who could not be unambiguously classified were discarded from this analysis.

Table 2

Comparison of Pre-Training Performance and Procedure Use for Good and Poor Learners

Variable	Good Learners (N=20)	Poor Learners (N=20)
Mean Percent Recall per Trial		
Complete elements	45.05**	20.20
Spatial attributes	48.20**	26.10
Verbal attributes	74.30**	52.15
Mean Frequency Rating of Procedure Use		
<u>Effective Procedures</u>		
Partitioning	3.24*	2.25
Memory-directed sampling	4.96	4.37
Evaluation	4.00	3.82
Imagery	5.05*	4.12
Pattern encoding	4.90**	3.68
Relation encoding	4.46**	3.04
<u>Neutral Procedures</u>		
Mnemonics	1.14	1.79
Spatial labeling	2.18	1.98
Rehearsal	4.52	4.70
Association 1	2.10	1.81
Association 2	0.35	0.75
Association 3	1.44	1.15

* $p < .05$
 ** $p < .01$

Table 2 contrasts these groups on reported use of the twelve procedures trained in this experiment. Differences between groups were evaluated using one-tailed t-tests. As the first three rows of Table 2 show, good learners were superior in recall of complete elements, spatial attributes, and verbal attributes. These learners also tended toward more frequent use of the "effective" procedures. While good and poor learners did not differ in their frequency of use of the evaluation procedure, good learners used four of the other five Effective Procedures significantly more often than did poor learners. In contrast, good and poor learners did not differ in their use of the Neutral Procedures. These results replicate the differences between good and poor learners reported by Thorndyke and Stasz (1979) and further indicate the efficacy of the effective learning procedures.

EFFECTS OF TRAINING

To determine the effects of instruction on the use of these procedures, we compared the pre-training and post-training scores for subjects in the three groups. Separate analyses of variance were performed for recall of complete map elements, recall of spatial attributes, and recall of verbal attributes. Figure 4 shows the data for recall of complete map elements. Overall, the mean recall score for the second map was greater than that for the first map, $F(1,40) = 71.31$, $p < .001$. The main effect for the training group was not significant ($F < 1$). More importantly, however, the predicted map-by-treatment interaction

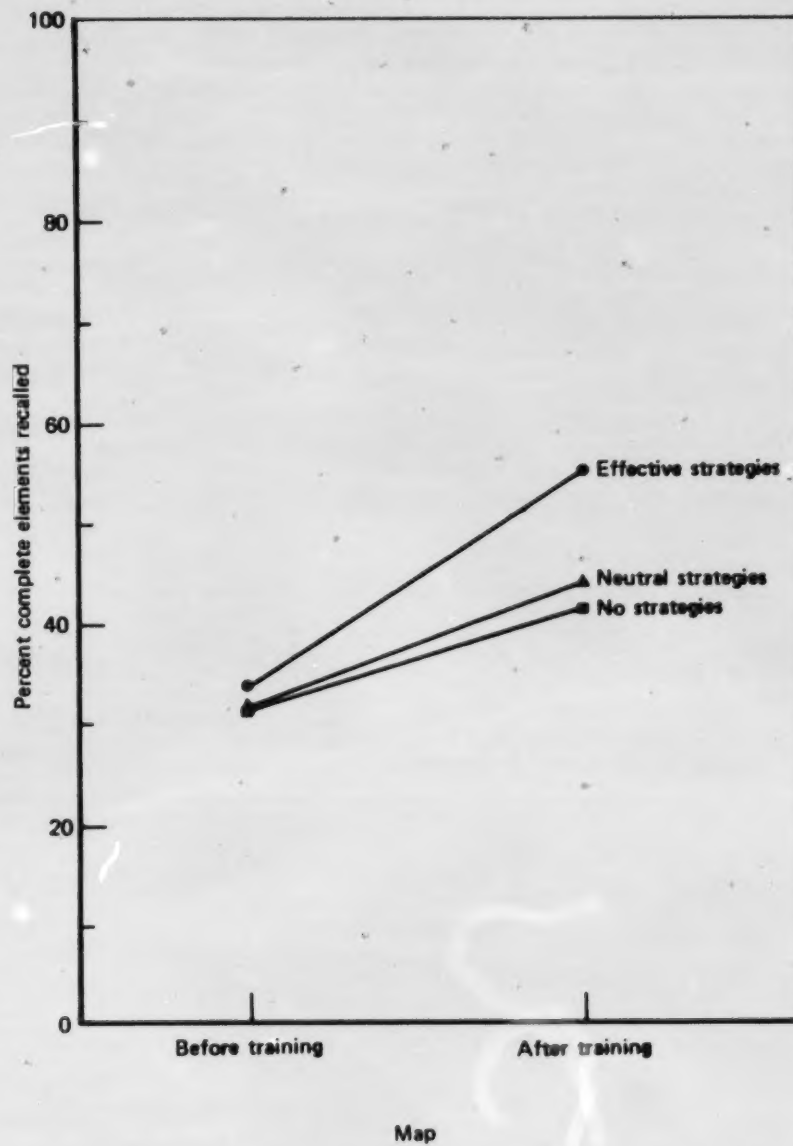


Figure 4. Recall of Complete Map Elements

was reliable, $F(2,40) = 3.32$, $p < .05$. A planned comparison confirmed that the Effective Procedures group recalled more on the post-training map than the Neutral Procedures and No Procedures groups, $t(80) = 4.49$, $p < .001$.

Figure 5 displays the results for recall of spatial and verbal attributes. Recall of spatial attributes (part A) improved from the first to the second map, $F(1,40) = 70.27$, $p < .001$. While group differences were in the expected direction, the interaction fell short of significance, $F(2,40) = 1.81$. However, a planned comparison indicated that the Effective Procedures group recalled more on the post-training map than the other two groups ($t(80) = 3.48$, $p < .001$). In contrast, recall of verbal attributes was nearly identical across maps and groups (part B).

To further explore the group differences on the post-training task, performance on the second map was analyzed by trial. Figure 6 presents the data for complete element recall. While the Effective Procedures group was superior on all trials, the main treatment effect was only marginally reliable, ($F(2,160) = 2.38$, $p < .10$), and the interaction was not significant, ($F(8,160) = 1.04$). However, as Figure 6 shows, the Effective Procedures group showed a marked improvement in recall after trial 2 relative to the other groups. Post-hoc comparisons declared the means for the Effective Procedures group to be

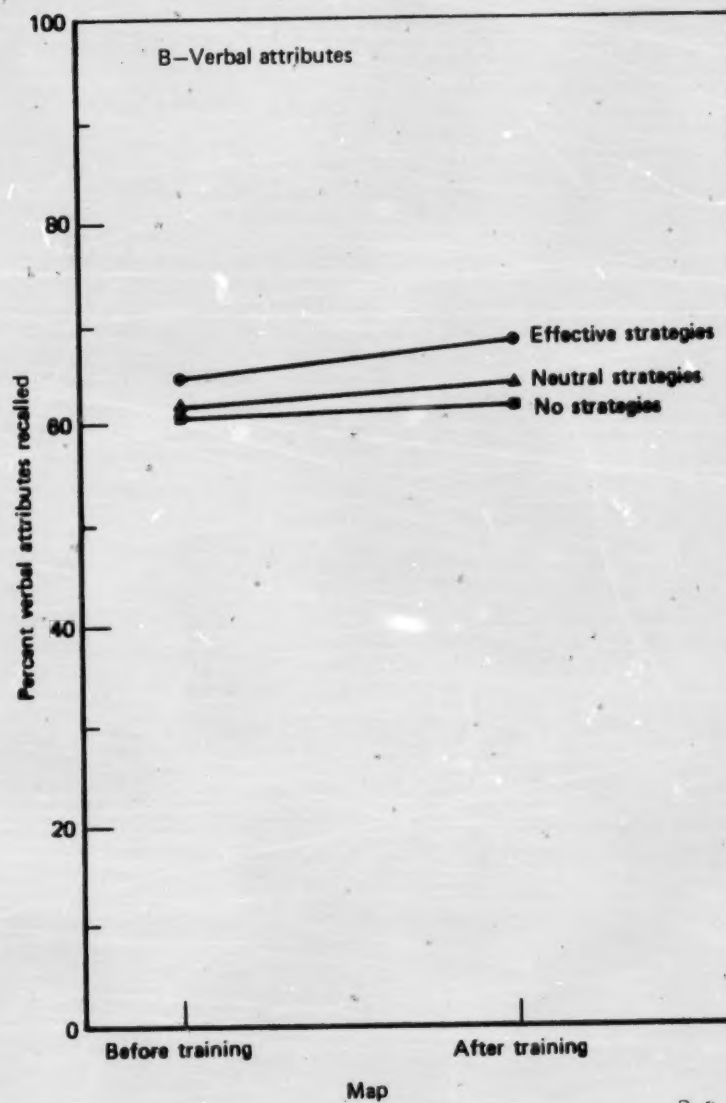
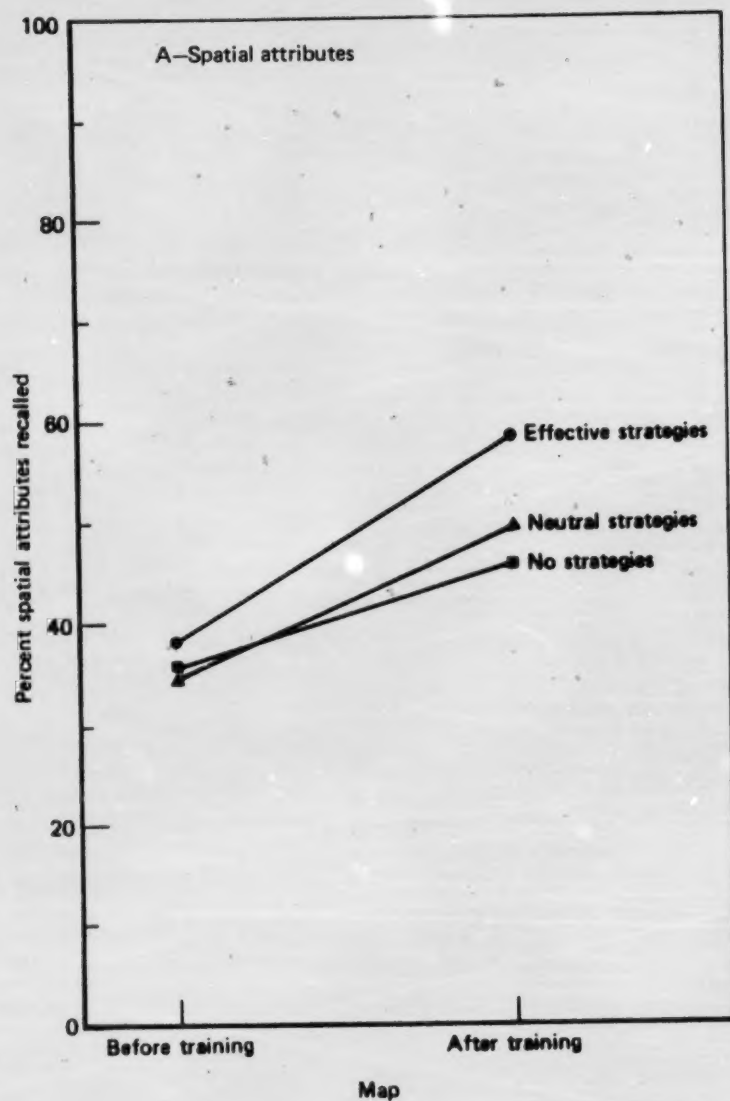


Figure 5. Recall of Spatial and Verbal Attributes of Map Elements

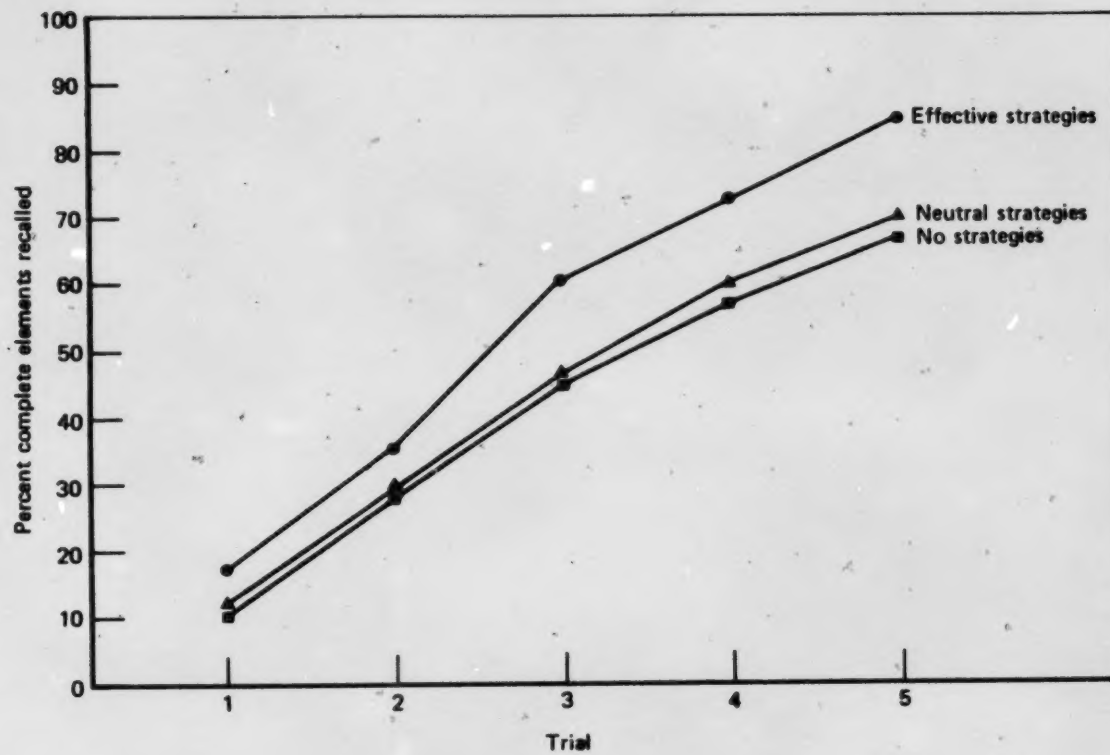


Figure 6. Recall of Complete Elements on Post-Training Map

larger than those for the Neutral Procedures group at trials 3, 4, and 5 ($p < .01$ for all comparisons).

Figure 7 presents the data for recall of spatial and verbal attributes by trial. For spatial recall (part A), comparisons of individual group means replicated the pattern of results in recall of complete elements. The Effective Procedures group had significantly higher recall than the Neutral Procedures group on the last three trials ($p < .05$ for all comparisons). For verbal attributes, the interaction between group and trial was reliable ($F(8,160) = 2.12$, $p < .05$).

As these analyses indicate, the advantage of the Effective Procedures training was not apparent until the third trial on the post-training map. This delayed effect may have been due to the fact that two of the effective procedures (memory-directed sampling and evaluation) could not be used until at least trial 2. Memory-directed sampling required the study of particular map information on trial n that had not been recalled on trial $n-1$. Evaluation required subjects to compare perceived map information on trial n to their recall of that information on trial $n-1$. In addition, these techniques are most effectively employed when much of the map has already been learned. Therefore, these procedures may not have been used extensively until later trials.

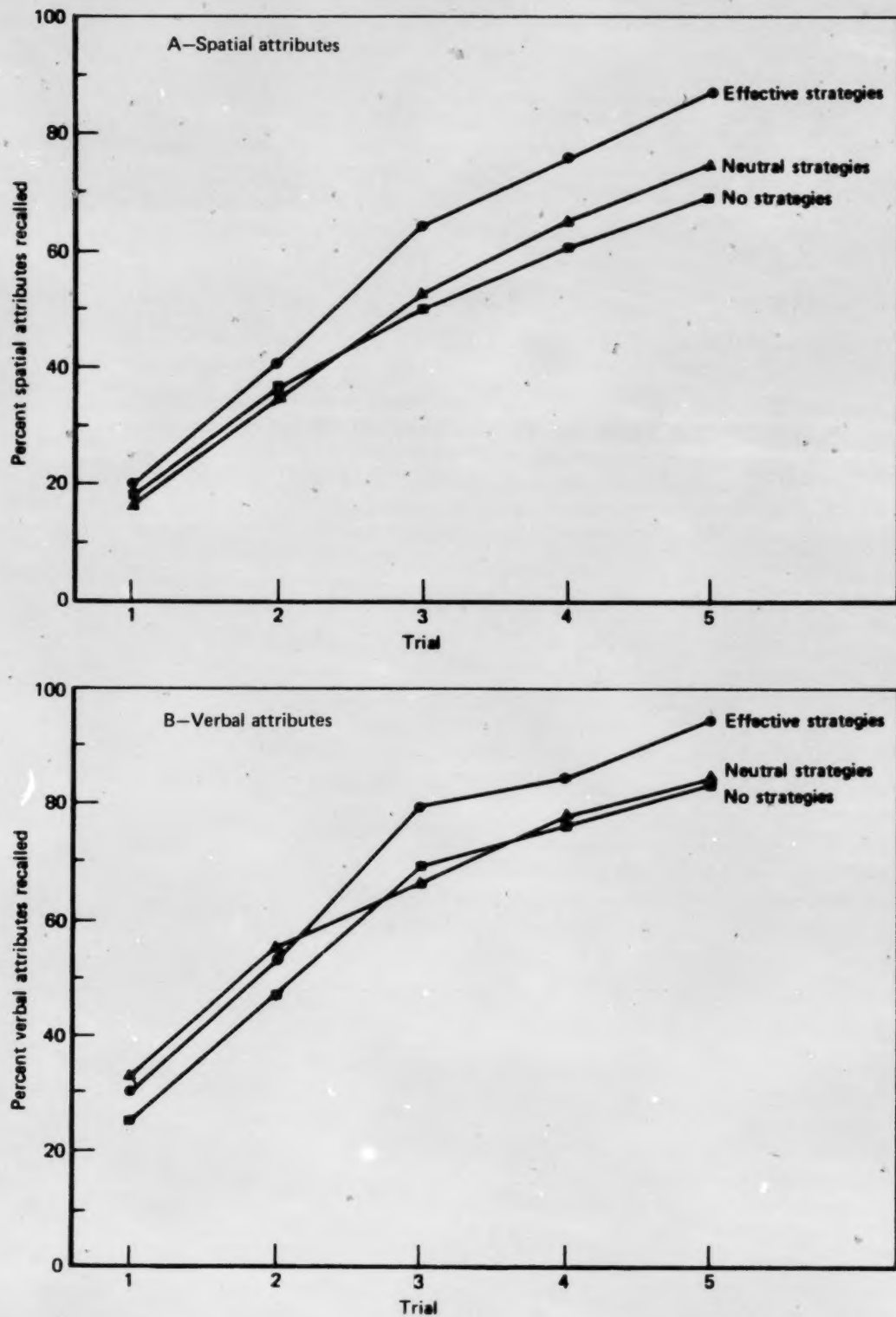


Figure 7. Recall of Spatial and Verbal Attributes of Map Elements on Post-Training Map

ASSESSMENT OF POST-TRAINING PROCEDURE USE

Presumably, the superior improvement of the Effective Procedures group over the other groups occurred because these subjects used the trained procedures (hereafter referred to as target procedures). To test this assumption, we scored the questionnaires to determine the frequency of use of procedures before and after training.

Table 3 shows the mean ratings for the use of Effective and Neutral procedures by the three groups. The results confirm that subjects did in fact increase their use of target procedures

Table 3

Mean Reported Frequency of Use of
Effective and Neutral Procedures

Group	Before Training	After Training
<u>Effective Procedures</u>		
Effective Procedures group	3.74 *	4.44 *
Neutral Procedures group	3.45	3.72
No Procedures group	4.38	4.23
<u>Neutral Procedures:</u>		
Effective Procedures group	2.18	2.14
Neutral Procedures group	1.96 *	2.53 *
No Procedures group	1.75	1.91

* $p < .05$

after training. The first three rows indicate that Effective Procedure use increased significantly after training for subjects instructed to use those procedures, $t(13) = 2.42$, $p < .05$, but did not increase for the Neutral Procedures or No Procedures groups. Similarly, the Neutral Procedures group reported more frequent use of target procedures on the second map than on the first, $t(15) = 2.31$, $p < .05$. However, use of these procedures did not increase for the other two groups.

To further support the conclusion that the use of the effective procedures improved performance, we computed within-group correlations between the reported use of effective and neutral procedures on the second map and the increment in recall across maps. This increment was measured as the difference in percent recall on the last trial of the two maps. Table 4 shows

Table 4
Correlations Between Mean Use of Procedures
after Training and Recall Increment

Treatment	Effective Procedures			Neutral Procedures		
	Complete Elements	Spatial Attributes	Verbal Attributes	Complete Elements	Spatial Attributes	Verbal Attributes
Effective Procedures group	.59 *	.55 *	.42	.16	-.23	-.12
Neutral Procedures group	.31	.32	.08	.17	.06	-.15
No Procedures group	.02	-.05	-.43	.03	-.41	-.54 *

* $p < .025$.

the correlations for recall of complete elements, spatial attributes, and verbal attributes. As expected, the use of effective procedures correlated reliably with improvement in complete element and spatial recall for subjects trained to use these techniques. That is, the more frequently subjects used the effective procedures, the greater their improvement in performance. Three of these procedures (imagery, pattern encoding, and relation encoding) operated on spatial information, while the other three (partitioning, memory-directed sampling, and evaluation) were equally applicable to spatial and verbal information. Therefore, we expected that the correlation between procedure use and performance increment would be higher for spatial attributes than for verbal attributes. As the first row of Table 4 shows, this expectation was confirmed. In contrast, we found no evidence that the use of Neutral Procedures facilitated learning.

VISUAL MEMORY ABILITY

In light of the important role of spatial learning procedures in determining overall learning success, we expected that subjects' visual memory ability would affect success on the learning task. In particular, since imagery and perhaps pattern and relation encoding depend on the use of a visualization process, the effectiveness of training in these procedures might depend on the subjects' ability to visualize spatial configurations in memory.

The analysis of the Building Memory Test scores provided data on subjects' visualization ability. The reliability of this test, estimated by the Spearman-Brown formula, was .76. The mean scores on the 24-item test were 17.61 for the Effective Procedures group, 18.48 for the Neutral Procedures group, and 15.48 for the No Procedures group. An analysis of variance indicated that the groups were indistinguishable in visual memory ability. Across all subjects, the correlations between visual memory and complete element recall ($r = .54$), spatial attribute recall ($r = .55$), and verbal attribute recall ($r = .44$) on the pre-training map were all significant ($p < .01$). The same correlations between ability and post-training performance were also reliable ($r = .63$, $r = .66$, and $r = .34$, respectively, $p < .01$).

To determine if training differentially influenced post-training performance for subjects with different visual memory ability, we performed a linear regression of performance increment on training group and ability. Figure 8 displays the increment in recall of complete map elements as a function of ability for each of the training groups. The solid lines represent the best-fitting function for each group, and the dashed lines display the 95% confidence interval for the predicted recall scores. As Figure 8 shows, recall increment increased with ability only for subjects in the Effective Procedures group. We wished to determine for what levels of ability the Effective Procedures training produced significant improvements relative to the other groups. We therefore used the prediction equations to contrast performance increment for hypothetical high-ability (ability score = 24), medium-ability

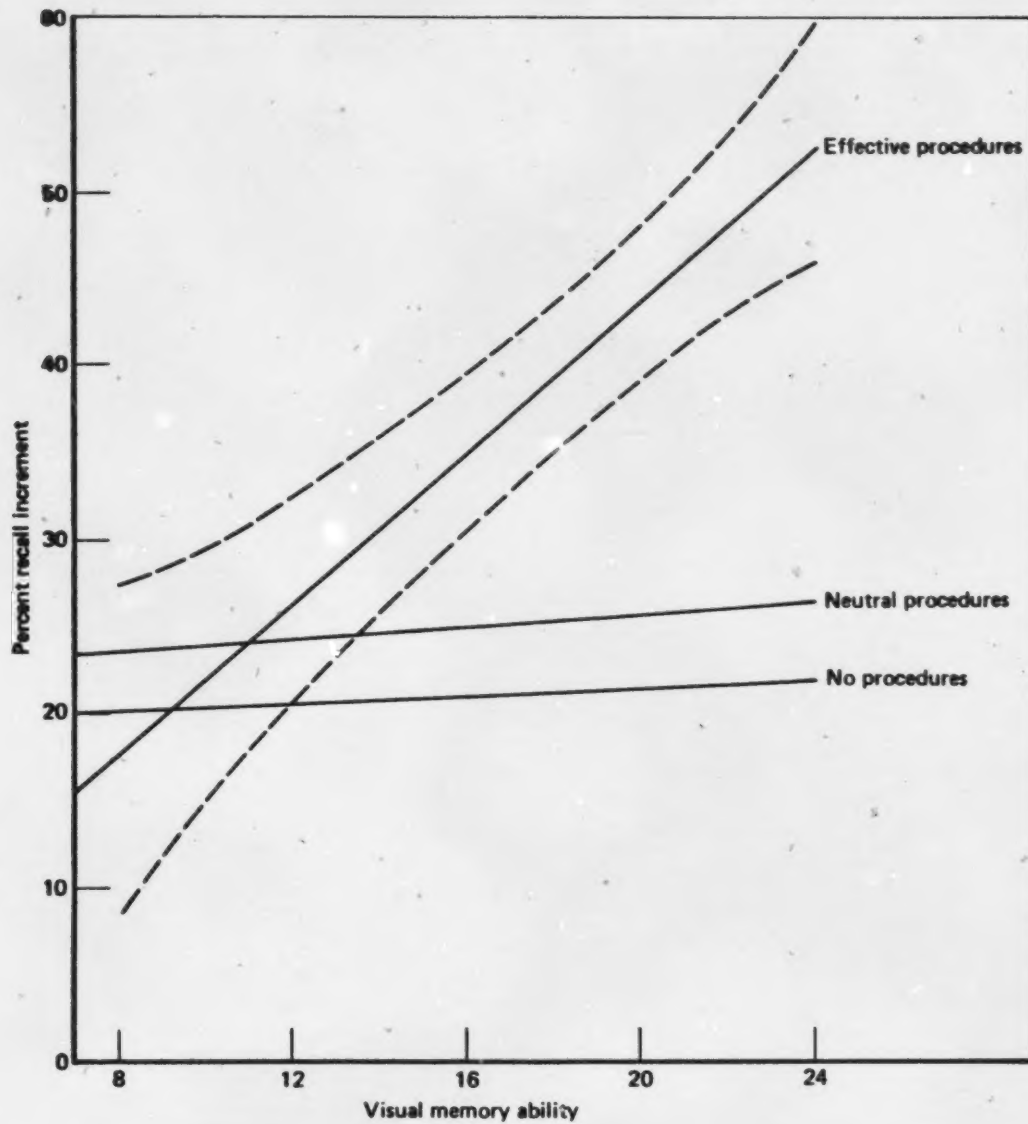


Figure 8. Best-Fitting Regression Line of Recall Increment (Complete Elements) on Visual Memory Ability

(= 17.41, the mean score across subjects), and low-ability (= 10) subjects. For high and medium ability, the increment for the Effective Procedures group was reliably larger than the mean increment for the other two groups ($t(37) = 3.23, p < .01$ for high ability, $t(37) = 2.32, p < .01$ for medium ability).

Figure 9 shows the increments in recall of spatial (part A) and verbal (part B) attributes as a function of Visual Memory ability. For recall of spatial attributes, the increment for Effective Procedures training was reliably greater than that for Neutral and No Procedures training for high- and medium-ability subjects ($p < .01$ for each). For recall of verbal attributes, the group differences were smaller and were reliable only for high-ability subjects ($p < .05$).

The finding that high-visual-memory subjects benefited most from training suggests that these subjects might have had an advantage over relatively low-ability subjects in successfully using the trained procedures. This advantage could arise from three sources. First, subjects with high visual ability might be more inclined to choose the spatial learning procedures on their own, and thus they presumably would be more practiced at using the procedures. The first two columns of Table 5, however, suggest that this was not the case. The first column gives the correlations across all subjects between visual memory ability and the use of the six effective procedures on the first map, prior to training. The second column gives the same correlations for the subjects in the Effective Procedures group. None of these

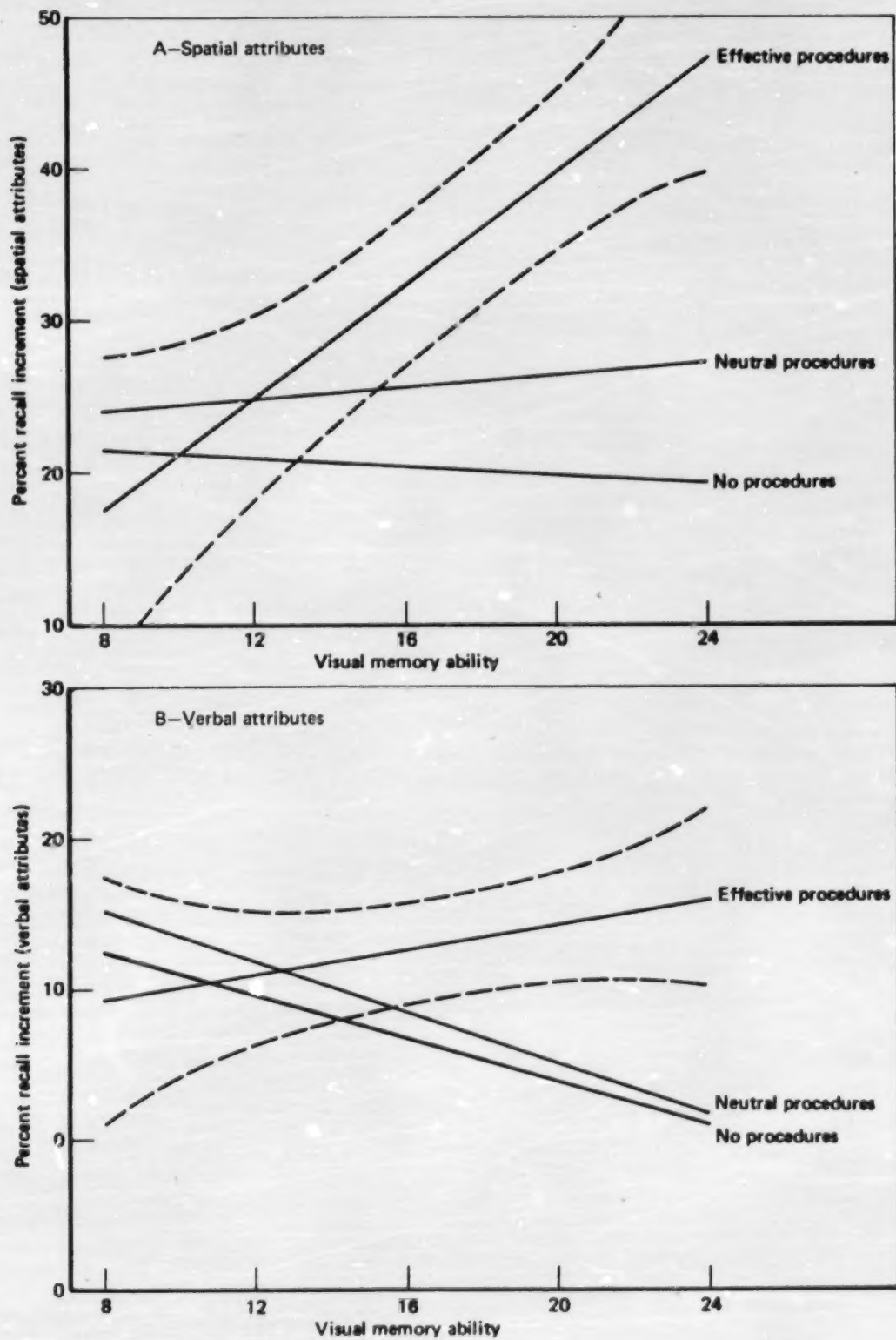


Figure 9. Best-Fitting Regression Line of Recall Increment for Spatial and Verbal Attributes on Visual Memory Ability

Table 5

Correlations between Visual Memory Ability
and Effective Procedure Usage

Procedure	<u>All Subjects</u>	<u>Effective Procedures Group</u>		
	Before Training	Before Training	After Training	Increment
Partitioning	-.01	.36	-.23	-.44
Memory-directed sampling	.08	.37	.22	-.30
Evaluation	.07	.27	.35	.15
Imagery	.11	.27	.50*	.24
Pattern encoding	.15	.02	.24	.20
Relation encoding	.27	.22	.43	.29

* $p < .05$

correlations is statistically significant. Thus, there does not appear to be a strong relationship between the choice of any effective learning techniques on the pre-test and visual memory ability.

The second possible explanation for the superior improvement of high-ability subjects is that they used the effective procedures more frequently after training than did the low-ability subjects. Subjects with low ability may have been less inclined to follow instructions to use techniques requiring visual memory than subjects with good visual memory. Across all effective procedures, the increment in frequency of use from the first to the second map was uncorrelated with ability ($r = .04$). However, as the last column of Table 5 shows, this correlation varied for individual procedures. For two of the three non-spatial procedures, low-ability subjects increased their

frequency of use relatively more than high-ability subjects. In contrast, we found positive correlations between increased use of the spatial procedures and ability. Thus, as the third column of Table 5 shows, high-ability subjects used two of the spatial learning techniques considerably more frequently on the second map than did their low-ability counterparts.

Finally, the effectiveness of the spatial learning procedures probably depends on visual memory ability. Subjects with poor visual memory may find these techniques difficult to use successfully. Thus, each use of an effective procedure might be more beneficial for high-ability than for low-ability subjects. To test this hypothesis, we regressed performance increment on visual memory ability and increment in procedure usage across subjects in the Effective Procedures group. When the variance due to the differences in procedure usage was removed from the prediction equation, ability accounted for a significant 27.6% of the remaining variance in performance increment, $F(1, 11) = 6.80$, $p < .025$.

IV. CONCLUSIONS

It is evident from these analyses that successful map learning depends on particular study procedures for selecting, encoding, and evaluating information. Our previous analysis of learning protocols (Thorndyke & Stasz, 1979) revealed several detailed differences in procedure usage between good and poor learners. Subjects' responses to the procedure questionnaire in the present study replicated these differences. To show that these procedural differences were responsible for performance differences, we attempted to improve map-learning skill by teaching subjects how to use six procedures that we had observed good learners employ frequently. This training did in fact improve subjects' performance relative to subjects who received no or irrelevant training.

While we obtained training-group differences for recall of spatial attributes, the groups did not differ in recall of verbal attributes. Individual differences in recall of verbal information and in the use of verbal learning procedures were much smaller than differences regarding the spatial information. Further, virtually every subject learned more verbal than spatial information on the maps. Because college students typically learn primarily verbal information (e.g., from textbooks, class lectures), they probably develop verbal learning skills and techniques. In contrast, students' relative lack of practice

at learning spatial information may restrict their repertoire of learning techniques and highlight ability differences.

Accordingly, the success of the effective-procedures instruction depended on subjects' visual memory ability. This ability was related both to how frequently subjects used the trained spatial learning procedures and to how successfully they executed them. Low-ability subjects, who presumably have difficulty creating and holding visual images in memory, would have difficulty in using these spatial learning procedures effectively. On the other hand, high-ability subjects could readily use procedures requiring attention to spatial information and the use of imagery. Thus, while high-ability subjects improved tremendously after training, low-ability subjects improved no more than subjects in the other training groups.

While both learning procedures and abilities appear to be important contributors to performance, we cannot yet assess their relative importance. Additional research is required to investigate whether subjects with relatively low visual memory ability may be taught to employ spatial learning procedures effectively. This question hinges on the precise relationship between the low-level processes required to perform psychometric tests of visual ability and those required for the use of high-level procedures. Some very basic spatial abilities, such as visualization, may consist of one or a few elementary processes. We view learning procedures as program-like combinations of these low-level processes. Visualization, for example, may be a single

component of a more complex procedure, such as evaluation. This procedure may require the visualization of information in the current focus of attention.

Traditionally, psychologists have viewed abilities as general traits relatively resistant to change. Many learning procedures, however, are presumably flexible skills that are trainable and may improve with practice (cf. Hasher & Zacks, 1979). Therefore, if low-visual-memory individuals cannot readily be taught to use spatial learning procedures effectively, then it would appear that their use is highly ability-dependent. For these individuals, optimal instructional design might capitalize on other learner aptitudes. For example, learners might be taught to use procedures that depended on processes they were skilled at using. Subjects themselves appear to be particularly adept at selecting strategies that are well-suited to their abilities (e.g., MacLeod, Hunt, & Mathews, 1978). On the other hand, if subjects of all abilities, given sufficient training, can learn spatial processing techniques, current assumptions about the nature of abilities and their explanatory power as a stable source of individual differences would be seriously challenged.

Our findings may have significant implications for the design of map training courses for the military. Since the use of effective processing procedures can significantly improve the amount and rate of map learning, instruction in the use of such procedures might provide a successful training vehicle.

Furthermore, these procedures might be useful in other military map-using tasks as well.

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- e. Whenever possible help angry children find a satisfying substitute activity for what they would really prefer to do. For example, "Screaming doesn't get you a turn. Terry needs a little more time on the swing, then you will have a turn. I will see that you get a turn, but let's work in the sandbox while you wait."
- f. Help children who have lost control to regain it. Children who have temper tantrums or have lost control of their anger in other ways need help from the teacher. They may need to be held or removed from the group until they are in control again, but this should never be done as punishment. They need to be reassured that they are still loved and that they can depend on the teacher to help them.

C. Jealousy.

1. Preventing unnecessary jealousy:

- a. Prepare children for the arrival of a new baby by showing them picture books about babies and helping them understand that the baby could be either a boy or girl.
- b. After the baby is born, allow special time for the older child, point out the advantages of not being a baby; do not be alarmed or make children feel ashamed if they call the baby names or express their dislike for the new baby.
- c. Avoid comparing children, and do not encourage competition among children. Organized games which have winners and losers have no place in the preschool.
- d. Encourage recognition of and pride in the efforts of each child by such statements as "It bothers me when one of you calls the other stupid. Neither of you is stupid. We all hammer and nail pieces of wood in our own ways. Everybody's way is special."

2. What to do when children are jealous:

- a. Encourage children to talk about their feelings and let them know you understand how they feel.
- b. Help them find more satisfactions of their own. Sometimes they may need help in developing friendships with other children or they may need help in finding satisfaction in doing things of which they are capable.
- c. Give children much affectionate understanding.

VI. General Environmental Causes Of Unpleasant Emotions.

- A. The general emotional tone of the environment---relaxed or tense.
- B. The way children are treated by adults.
- C. Disruptions of routines---some children become very tense when there is even a slight change in their daily routine. The disruption of the daily routine over the weekend is one reason Monday can be such a "bad" day in the Child Care program.
- D. Adjustment to a new situation---arrival of a new brother or sister, divorce of parents, a new teacher, etc.

VII. Effects of Heightened Emotionality.

Because the unpleasant emotions are more often involved in heightened emotionality and because they present more problems for children and for those who live and work with young children, the possible harmful effects of states of disequilibrium on children are discussed below.

A. On physical well-being.

The presence of strong emotions causes an immediate increase in heartbeat, blood pressure, breathing, and adrenaline production---all of which provides energy to prepare the person for intense activity. If this energy is not used up in some way, it can cause physical problems:

1. Digestive disturbances.
2. Anemia, caused by digestive disturbances.
3. Exhaustion.
4. Inability to sleep.
5. Headaches.
6. High blood pressure.
7. Allergies.
8. Temporary or permanent damage to the structure and functioning of the internal organs.

NOTE: The degree to which children are affected and the amount of damage done depends on the strength, frequency, and length of the emotional state.

B. On behavior.

1. Behaves more like a younger child.
2. Is not as well-coordinated as usual.
3. Makes more mistakes than usual.
4. Has more accidents than usual.
5. May stutter or slur words when talking.

C. On mental efficiency.

Cannot remember, concentrate or reason as well as usual.

D. On social adjustments.

Children who experience frequent or prolonged states of disequilibrium will have a very few happy and satisfying social relationships.

E. On future emotional behavior.

1. When heightened emotionality is due to physical causes alone or from the need to adjust to new situations, it may be temporary and limited in its effects.
2. When it comes from psychological or environmental causes, however, it can become a habit.
3. Children may develop into adults who tend to respond with heightened emotions to any similar type of situation.

VIII. Emotional Control

As children grow older, they are expected to gain control over the forms of emotional responses made and to learn when specific emotional states are appropriate. For example, four-year-olds are learning to control the response to anger when they replace hitting and screaming with words. Furthermore, one-year-olds may become very angry because they are hungry before dinner is ready. However, by the age of three, although children may be hungry before dinner is ready, they have learned that anger will not help; they have learned to tolerate some delay.

A. Importance of emotional control.

1. Social acceptance.

Children who cannot control their emotions at the level expected for children of that particular age will be considered immature by others---especially peers.

2. Physical health.

- a. During the occurrence of strong emotions---whether pleasant or unpleasant---all of the body processes speed up. These changes occur quickly and prepare the child for immediate action.
- b. Sustained heightened emotions can cause fatigue and over a long period of stress, lead to physical illness.

3. Mental health.

Lack of ability to control emotions, especially the unpleasant ones, can lead to feelings of guilt, fear, or lack of self-confidence.

B. Effect of emotional control.

All emotional states are accompanied by both physical and mental preparation for action. Children may control their responses when they are afraid; however, there must be some way of releasing the physical and mental energy which has been aroused. Expressing the emotional response in a socially-acceptable form is not always enough. Some of the common ways in which children release this pent-up energy are:

1. Moodiness.

- a. Children may bottle-up the emotional energy for hours or even days, during which time they have a tendency to over-react to almost any situation.
- b. If an unpleasant emotion has been controlled, they will be gloomy and sullen, listless, preoccupied with themselves and uninterested in others.
- c. If a pleasant emotion is controlled they will be pleasant, eager and enthusiastic about whatever they do and will seem to "glow" with an inner satisfaction.

2. Substitute responses.

- a. Children can learn to substitute a more socially-acceptable response for their usual responses.
- b. Those who can find satisfying substitute responses are better able to release emotional energy and maintain social acceptance at the same time.

3. Displacement.

In this case children direct the emotional responses toward a person, object, or situation which is not related to the source of the emotion.

4. Regression.

This emotion involves going back to earlier forms of behavior.

5. Emotional explosions.

This involves reacting violently to a seemingly trivial situation. It occurs when children try to control the expression of an emotion too long, or when the emotion is too strong to control. Children, thus, release the emotional energy, but may feel guilty.

IX. Helping the Child Develop Emotional Control.

A. Significant facts about emotional control.

If teachers are to help children develop emotional control in a way that is best for them, it is important to remember the following facts:

- 1. There is no one best way to express a controlled emotion. Teachers must help each child develop those forms which are both socially acceptable and clear the system of the energy aroused by the emotion.

2. The mental aspects of an emotion must be given as much attention and consideration as the physical. Just finding a socially-acceptable way to react to anger does not guarantee that each child will stop being angry.

B. Guiding emotional control.

1. Helping children use up emotional energy in socially-acceptable ways.
 - a. Strenuous physical activities such as hammering, running, jumping, climbing, pounding clay, or play dough, etc., can use up the pent-up energy. Teachers can guide each child into such activities and gradually help the child learn to recognize when the needs arise.
 - b. Using words to express emotions. Children can be helped to use "words instead of blows."
 - c. Crying often helps release emotional energy but children soon learn that this is considered babyish. Teachers should not encourage frequent crying, but should help children realize that it is all right for boys and girls to cry. Teachers will need to comfort and sometimes protect the crying child.
 - d. Laughing, like crying, can help release emotional energy.
 - e. Doll play often permits children to express strong emotions in an acceptable way.
2. Helping children control the mental states which accompany the emotion.
 - a. Encourage children to talk things over with you. For example, if the children are angry with the teacher for requiring them to put on their jackets before going outside, it will help them if they can understand why they must do this. The teacher can accept their anger without giving in to it. The teacher must be both affectionate and firm.

- b. The goals should be to help the children learn to think about the situation before making an emotional response, to decide for themselves whether a response is justified or not, and to think before reacting.

CHAPTER X

INTELLECTUAL DEVELOPMENT

RATIONALE

Intellectual development is sequential, involving many developmental processes and influenced by a variety of factors. To provide an environment conducive to each child's intellectual growth, the parent and/or teacher must be aware of the stages of intellectual development, the influencing factors, and those techniques utilized to facilitate learning and stimulate the child's curiosity.

ESSENTIAL CONTENT INFORMATION

I. Relationship Between Heredity and Environment in Intellectual Development.

A. Heredity.

The inherited intelligence is a potential, dependent upon stimulation from the environment and response from the individual to be developed.

B. Environment.

A highly stimulating environment may enhance intellectual growth---a dull, drab, or highly chaotic environment may retard it.

C. Relationship.

Clear evidence about the relationship between hereditary and environmental influences upon intelligence is difficult to find. Arguments about the relative importance of an individual's heredity or environment are meaningless because both are required for intellectual development. Both heredity and environment begin to exert influences from the time of conception. They cannot be meaningfully separated from each other.

II. Curiosity---The Impetus to Learn.

A. Definition.

Curiosity is an expression of interest in the environment, in one's self, and others.

B. Effect on development.

1. Children have an innate desire to acquire knowledge and become competent in dealing with their surroundings.
2. Healthy children manipulate, discover, repeat experience, and try to adapt what they know to meet their needs.
3. They have strong needs to make sense of the world around them---to see relationships, observe causes and effects, and determine sequences or patterns of events.
4. This interest in the environment, in self and in others shows itself most clearly in the playful and exploratory behavior of young children.

III. Intellectual Development in Infancy.

Every normal infant born into the world has the potential for cognitive or intellectual development.

A. Sensory-motor activity.

1. The senses of touch, vision, taste, smell, and hearing are the resources with which learning begins.
2. As infants gain control of their physical bodies, they also learn through their movements and the manipulation of objects.
3. This sensory-motor activity is the first mode of learning identified by Piaget.

4. In responding to sensory-motor stimulation, babies learn to recognize the characteristics of the situations and things around them.
5. As babies' needs are repeatedly met by their mothers ---through feeding, diapering, talking, patting---they learn to associate the sight of their mothers with comfort.
6. Through senses they learn that the terry dog is soft and bumpy, the plastic ball is hard and smooth, and they figure out that the mobile over their tummies will move and jingle when they kick the sides of their cribs.
7. They subject favorite objects to repeated visual scrutinies; they also feel, squeeze and shake them.
8. As children perceive, manipulate, and are stimulated by these things in their worlds, they store the experiences in their minds and relate them to each other.

B. Assimilation.

1. Knowledge about the world becomes associated with things heard, seen, tasted, smelled, and touched.
2. At first, newborn children hear a bell ring and begin to cry.
3. They are responding only to the sensory impact of the sound.
4. Later, associations they have made in their experiences with bells will influence their responses.

IV. Importance of Early Sensory Stimulation to Development.

A. Sensory stimulation.

1. Early infant learning is primarily sensory-motor, and infants who do not have adequate sensory stimulation suffer from this deprivation.

2. They do not establish the brain cell functioning that is necessary for optimum cognitive development.
3. When the necessary network of brain cells is not developed during the first few months of life, the development of higher intellectual functions is slowed.

B. Nutrition.

1. We also now know that the provision of adequate nutrition during the last six months of prenatal development and first two years of life is necessary for the physical development of the nerve cells that carry messages from the senses to the brain.
2. Severe malnutrition during these early months may result in the irreversible limiting of intellectual potential.

C. Sensory experiences are basic to learning at all ages.

V. Beginnings of Language and Concept Formation.

A. Language and learning.

1. Once children begin to comprehend and use language, they have a tool for thinking and remembering---they do not have to rely on sensory-motor learning alone.
2. Their basic learning is still sensory-motor, but now they can do many interesting things with the experiences that they could not do before.
3. Concept formation begins when children use a word like "dog" to refer to a whole class of animals called "dog" and not just to their own pets.
4. Fruit, vegetable, farm, car, and clothing are examples of class words children explore in the preschool years.

B. Clarifying concepts.

1. Adults can aid children by helping them correct and enrich their concepts.
2. To toddlers all four-legged animals may be "doggies" for a while---until adults help them recognize the difference between cows, horses, cats, and dogs, and correctly name each class.
3. Children's concepts are enriched as they have many chances to see, hear, feel, smell, and play with different kinds of dogs.
4. They can learn that "dogs" may be "large," "small," "shaggy," "hairless," "friendly," "cross," etc.
5. The more first-hand sensory experiences children have with dogs, the richer their concepts of "dog" become ---the better they are able to cope with dogs and to understand how dogs relate to human beings.
6. They can also talk about dogs and use language to label the characteristics of dogs.
7. Words are the retrieval code to the memory.
8. If I say the word "dog"---what do you think of? The word may trigger a flood of memories of pets known and loved, a frightening or sad experiences, of dog characters and their interesting habits. The longer you think, the more experiences may be retrieved from your memory.
9. Helping children learn to use words helps them remember and recall.

C. Preoperational-beginning language use from infancy to around six years of age (Piaget).

1. Children gobble up information about everything they can see, touch, hear and name.

2. They are establishing relationships between these real things---seeing causes, effects, noting sequences of events and how they evolve, seeing likenesses and differences.
3. In their thinking they cannot, however, move very far beyond their own "self" and the objects and events they have experienced.
4. They cannot move or manipulate things in their minds ---they cannot "operate" them mentally (hence, pre-operational.) For example, it is an impossibility, to their preoperational minds, that their teacher could be their friend Johnny's mother. She is their teacher, and cannot think of her in any other relationship.
5. Even around age five, they may not be able to count ten blocks, pointing to each one as they count, if you ask them to think of one block and then two more blocks, and count them "in their heads"---they cannot manage it. Nor can they tell you how many would be left if you took one of the three blocks away. These are mental operations their minds cannot manage until around the age of seven.

D. Importance of experiences.

1. Considerable research shows that the richer children's experiences are with real objects during the early childhood years---with talking about them, recalling them, generalizing, observing, discovering sequences like the seasons of the year, the development of a butterfly, or the making of butter---the better they are able to manage "operations" when they are mentally ready for this type of learning.
2. Piaget and other learning theorists believe that each stage of mental development is important.
3. Rather than try to rush children into learning for which they are not mature enough, it is important to understand each learning period and its implications and to learn how to enrich the child's experiences to take full, rich advantages of the opportunities offered.

VI. Guidelines for Promoting Early Learning and Curiosity.

- A. DON'T, in a desire to teach children proper behavior, discourage their natural curiosity by constant reminders such as "Don't touch." "Be careful." "Dirty!" or "Don't ask that!" In the face of too many such admonitions, the children learn that their curiosity and interest in the world is not acceptable and is causing them difficulty. They may give up and become complacent about learning. In an eagerness to teach, adults may stop children from learning. Learning is a process that takes place within the child. The early learning center is the place where it is more important for the child to learn than it is for the teacher to teach.
- B. DON'T provide all the answers yourself. Ask leading questions to help children become interested and make observations themselves by such comments as, "Isn't that interesting?" "I wonder why?" "What do you think?" "What is this?" and "What will happen next?"
- C. DO set up a predictable and relaxed environment within which children are safe to do much of their own learning.
- D. DO provide enough structure and order that children can begin to understand how things work and why. This helps them begin to look for and appreciate the order and structure in their larger environment.
- E. DO provide a wide variety of opportunities for learning at the children's developmental level.
- F. DO be enthusiastic about learning and share this enthusiasm with children.
- G. DO listen to children and accept their comments and points of view.
- H. DO let children know their thoughts and ideas are valued, interesting and worthwhile.

VII. Suggestions for Stimulating Sensory-Motor Development.

- A. Provide pleasurable touch experiences; patting, cuddling, swaddling with a blanket.
- B. Talk with infants. Respond to their social overtures. Imitate their sounds. They will love it!
- C. Move the infants about. Get them out of the crib. Think about the infant in a primitive culture going to market on mother's back. How many interesting sights, sounds, smells!
- D. Provide rattles, textured toys, mobiles, and balls to be explored. Children like objects with interesting designs and things that move and change.
- E. Explore sound-making objects.
- F. When toddlers can move on their own, give them things to push, pull, drag, sit on, carry, climb over and through. Give them different sized containers to carry and drop things into. They are exploring space and their relation to it at this age.

VIII. Considerations for Stimulating Concept Formation and Thought.

- A. Expose young children to experiences involving a wide variety of concepts---food, animals, the family, color, numbers, letters, distance, space, machines, seeds, etc.---by matching the content of the concepts to the child's developmental level.
- B. Ask open-ended questions that encourage the children to think for themselves---"What is big to you?" "What is big to an elephant?" "What do you know that is shaped like a doughnut?" "How many uses can you think of for a hole?" "Are cats and dogs alike?" "Different?"

- C. Play puzzle games to help children recall and understand. "I'm thinking of something that grows on a tree. It is red and has black seeds." "How many things can you think of that crawl?" "That jump?" "Where does milk come from?" "Bread?" "What will happen if you put a snowball in the oven?" The children's answers and discussion will give you clues to experiences. You can plan to correct and enrich their concepts.
- D. Treat children's questions with respect. Whenever possible give them enough help that they can discover the answers for themselves. Give them materials and encouragement to experiment and find out from their own experiences. Suggest people they can ask. Help them look in books.

LEARNING ACTIVITIES

NEONATE OBSERVATION

Observe an infant four weeks of age or younger for a total of one hour. (This may be in short intervals totaling one hour or a single one-hour period.) A hospital's nursery is a good source for this observation. Use the attached form to record the following observations:

1. Did you observe any reflex action?
2. What reflex was it?
3. To what was the reflex in response?
4. What experiences did the infant have during your observation?
5. Evaluate any experiences you observed.

TO BE TURNED IN:

The completed evaluation form.

OBSERVATION REPORT

Check the reflex(es) observed and specify the event which caused the reflex.

REFLEX	CAUSE
Mono_____	_____
Darwinian_____	_____
Pain_____	_____
Rooting_____	_____
Gagging_____	_____
Blinking_____	_____
Warming_____	_____
Smothering_____	_____
Babinski_____	_____

Check the experience(s) observed and briefly discuss the behavior of available adults in each situation.

EXPERIENCE	DISCUSSION
Crying_____	_____
Feeding_____	_____
Changing_____	_____
Bathing_____	_____
Holding_____	_____

OBSERVATION: SOCIAL-EMOTIONAL DEVELOPMENT

Select a child for an observation of social and emotional development. Observe the child for two hours. (This may be in short intervals totaling two hours or a single two-hour period.)

On the attached form, record your observations, related to the child's development.

TO BE TURNED IN:

Your completed observation form.

OBSERVATION: SOCIAL-EMOTIONAL DEVELOPMENT

Child's sex:_____

Date:_____

Age (in months):_____

Time:_____

A. Describe the physical setting of the observation (place, people present, atmosphere, situation).

B. The Development of a Conscience or System of Control

1. What evidence were you able to observe of the child's response to adult direction?
2. What evidence were you able to observe of the child's response to directives and suggestions of other children?
3. What are some standards and limits set for the child in the center?
4. Does the way in which the limits are enforced influence the child's response?
5. Does the child react differently to the enforcement of limits by different people?

6. What evidence did you see of the child's self-discipline?

C. Identification

Describe an incident which you feel give evidence of identification with an adult model. Who do you think the model is?

D. Concept of Self

Describe two incidents which you feel evidence something of what and how the child feels relative to self-concept.

E. Demonstration of Specific Emotions

Record examples of the child's expression of each of the following emotions:

1. Fear
2. Anger
3. Jealousy
4. Curiosity

5. Happiness

6. Affection

F. Demonstration of Social Behavior

Record examples of the child's expression of the following social behaviors:

1. Negativism

2. Aggression

3. Cooperation

4. Sympathy

5. Rivalry

6. Dependency

OBSERVATION: PHYSICAL DEVELOPMENT AND MOTOR SKILLS

Select a child for observation of physical development and motor skills. Observe the child for a total of two hours. (This may be in short intervals totaling two hours or a single two-hour period.)

On the attached observation form, record your observations related to the child's development.

TO BE TURNED IN:

The completed observation form.

OBSERVATION: PHYSICAL DEVELOPMENT AND MOTOR SKILLS

Child's sex: _____

Date: _____

Age (in months): _____

Time: _____

A. Describe the physical setting of the observation (place, people present, atmosphere, situation).

B. Physical Characteristics:

1. Is the child tall, short, medium tall? Slender or stocky? Small-boned or large-boned?
2. Is the child's manner alert, interested, enthusiastic or listless?
3. Is the child happy, vigorous, listless, or methodical?
4. Is the child right-handed or left-handed? Describe the activity on which you base this judgment.
5. Is the child's facial expression alert or dull?
6. Are the child's eyes clear and bright or dull and listless? What is their color?

7. Does the child usually carry his/her head forward or erect?
8. Are the child's shoulders flat or rounded?
9. Do the child's feet turn forward, inward, or outward?
10. Are the child's teeth evenly spaced?
11. Does the child bite or suck his/her lips?
12. Is there a nasal discharge? Does the child often pick at his/her nose?
13. Is the child's skin clear, smooth, pink, rough or pale?
14. Is the child's hair soft, shining, rough, dull or dry? What color is it?

C. Gross Motor Skills:

Describe in detail the following motor skills that this child exhibits. Give examples to support your descriptions.

1. Running (Does the child run smoothly, turn corners easily, fall often, etc?)
2. Jumping (Does the child land standing up; can the child jump from a height, etc?)
3. Hopping and skipping (Can the child jump on one foot, hop with rhythm, etc?)

4. Balance (Can the child balance on one foot, walk a balance board with few step-offs, etc?)
5. Climbing steps or ladders (Does the child "mark time" on each step or use alternate feet when climbing?)
6. Throwing and catching a ball (Does the child catch the ball with hands or catch it by clasping it to the chest; throw over-handed, etc?)

D. Fine Motor Skills:

1. Use of a crayon or pencil (Does the child hold it with the fist or like an adult; make few large capital letters, draw shapes, or scribble randomly?)
2. Use of scissors (Can the child use the scissors easily and cut smoothly, follow a line when cutting, etc?)
3. Use of eating and drinking utensils (Can the child eat without spilling, without getting food on the face, hold spoon in fist, etc?)
4. Personal care (Does the child button and fasten clothes, tie shoes, comb hair, etc?)

PHYSICAL DEVELOPMENT OF PRESCHOOL CHILD

Answer the questions on the attached form with short paragraphs.

TO BE TURNED IN:

Your completed form.

PHYSICAL DEVELOPMENT OF PRESCHOOL CHILD

1. a. Describe the physical image you held of yourself as a child.

b. How keenly were you aware of this image?
2. When you were a child, how much did your physical characteristics contribute to or hinder your personality development?
3. Compare how you felt about your physical traits in childhood and in adolescence.
4. a. List your physical traits that you liked best and those you liked least as a child.

b. How was your adjustment positively or negatively affected?

5. What part has some specific physical factor--such as height, weight, health or motor coordination--played in your life?
6. List the most and least effective ways that home and school have affected your own physical development.
7. Tell how an accident or illness has affected both your short-term and long-term adjustment.
8. Appraise the adequacy of provisions in your own home and preschool center for health education and physical fitness.

DEVELOPMENTAL STAGE CHART

Complete the chart on the following page to show the major milestones of development for various areas of development, for each stage of development.

TO BE TURNED IN:

The completed Developmental Stage Chart.

DEVELOPMENT STAGE

DEVELOPMENTAL AREAS

PHYSICAL

COGNITIVE

SOCIAL

EMOTIONAL

LANGUAGE

INFANCY

TODDLERHOOD

PRESCHOOL

KINDERGARTEN

128

129

DEVELOPMENTAL TASK MEDIA

Make an illustrated chart, poster, flip chart or notebook to demonstrate your understanding of the Developmental Tasks of the infant. You may use either photographs, drawings, or magazine illustrations.

Decide which form of media will be most useful to you in your own life, and prepare the material so that each Developmental Task will be clearly stated.

TO BE TURNED IN:

Your illustrated Developmental Task material.

ACTIVITY FILE CARDS: MOTOR SKILLS

Develop a total of ten (10) activities for enhancing the motor development and coordination of the children in your classroom. These will be divided into two categories: Gross motor and fine motor. There will be five (5) cards for each category.

Use the uniform file card format developed by the CDA program for writing up your activities. These activities can be easily added to your resource file if written on 5" x 8" file cards.

(Reduced Sample Card)

Curriculum Area (Topic)
Teacher Goal:
Objective(s):
Materials:
Procedures:
Evaluation:

TO BE TURNED IN:

Duplicates of the ten activity cards: Gross motor, five cards; fine motor, five cards, after the activities have been presented.

ACTIVITY FILE CARDS: SENSORY PERCEPTION

Develop at least five (5) activities for promoting sensory perception for the children in your class.

Use the uniform file card format developed by the CDA program for writing up your activities. These activities can be easily added to your resource file if written on 5" x 8" file cards.

(Reduced Sample Card)

Curriculum Area (Topic)
Teacher Goal:
Objective(s):
Materials:
Procedures:
Evaluation:

TO BE TURNED IN:

Duplicates of the five activity cards, after the activities have been presented.

ACTIVITY FILE CARDS: LANGUAGE

Develop five (5) activities for promoting language abilities of the children in your class.

Use the uniform file card format developed by the CDA program for writing up your activities. These activities can be easily added to your resource file if written on 5" x 8" file cards.

(Reduced Sample Card)

Curriculum Area (Topic)
Teacher Goal:
Objective(s):
Materials:
Procedures:
Evaluation:

TO BE TURNED IN:

Duplicates of the five activity cards, after the activities have been presented.

CHILD DEVELOPMENT ARTICLE REVIEW

Review a current article pertaining to child growth and development and write a report which includes the following information:

1. Title of Article
2. Author
3. Magazine or Book
4. Date of Publication
5. Summary of Article

TO BE TURNED IN:

A written report containing the information outlined in items 1 through 5.

VISUAL AID: PICTURES TO ENCOURAGE EMOTIONAL EXPRESSION

Construct a visual aid to encourage children to express themselves verbally.

I. Purposes for Children:

- A. To encourage verbal expression.
- B. To share ideas with the group.
- C. To understand that other people have feelings, too.
- D. To understand that other people have ideas, too.

II. Procedure for Use with Children:

- A. Use at circle time or with a group of four or five children. If used at circle time, it might be best to use only one picture and then use a story depicting similar events or feelings.
- B. Hold the picture up and ask one child, or let children volunteer, to tell what is happening in the picture. Proceed with questions, allowing for a variety of responses. There should be no right or wrong answers; all should be acceptable. If the children are not pressured by fear of being wrong, they will be more apt to contribute ideas.

III. Materials Necessary for Constructing Pictures:

- A. One piece of colored poster board.
- B. Four pictures* of children which depict four different emotions and situations. For example, a picture of a small group of children working or playing cooperatively and obviously happy; a picture of a crying child kneeling down on the sidewalk beside an overturned tricycle.
- C. Ruler, scissors, glue and flet-tip pen.
- D. Clear contact paper (optional).

*NOTE: Pictures should be large and clear enough for the entire group to see at circle time.

IV. Complete the Following Steps:

- A. Select pictures.
- B. Cut poster board into four equal pieces.
- C. Trim pictures.
- D. Mount pictures on poster board, leaving a border.
- E. Cover picture and front of poster board with contact paper.
- F. Make up at least five questions for each picture, such as:
 - 1. What is happening in this picture?
 - 2. How do you think the child fell off the tricycle?
 - 3. How do you think the child feels? or, Why is the child crying?
 - 4. Have you ever fallen off your tricycle?
 - 5. How did you feel?
 - 6. What do you think the child will do now?
- G. Print the questions on the back of the picture.

V. After the teaching aid is used, evaluate it for the following:

- A. Effectiveness in encouraging verbal expression.
- B. Sharing ideas with the group.
- C. Understanding that other people have feelings.
- D. Understanding that other people have ideas.

TO BE TURNED IN:

A neatly-written description of the evaluation that you did.
(Refer to item V.)

INTERPRETATION OF CARTOONS

Make a collection of five (5) cartoons in which a particular emotion or feeling is expressed. Attach each cartoon to a sheet of plain $8\frac{1}{2}$ " x 11" paper. Write a brief description below each cartoon, including the following information:

1. Emotion or feeling you think is expressed.
2. Events that happened immediately beforehand.
3. How the situation will be resolved or what will happen next.

TO BE TURNED IN:

Your collection of mounted cartoons and the information requested in items 1 through 3.

CHAPTER XII
SUPPLEMENTAL MATERIALS

CHILD GROWTH AND DEVELOPMENT

SUPPLEMENTAL MATERIALS

BOOKS

1. Ambron, Sueann.
Child Development.
Corte Madera, California: Holt, Rinehart and Winston, 1975.
2. Andy, Andrew and Steven Schepp.
How Babies are Made.
New York: Time-Life Books, 1968.
3. Andrews, J. D., ed.
One Child Indivisible.
Washington, D. C: National Association for the Education of
Young Children, 1975.
4. Apgar, Virginia, M. D.
Is My Baby All Right? A Guide to Birth Defects.
New York: Simon and Schuster, 1972.
5. Bergstrom-Walan.
Boys and Girls Growing Up.
Belmont, California: Fearon Publishers, 1967.
6. Better Homes and Gardens Baby Book.
New York: Benjamin Company, 1975.
7. Biber, Barbara, et al.
Promoting Cognitive Growth: A Developmental-Interaction Point
of View.
Washington, D. C: National Association for the Education of
Young Children, 1971.
8. Bowlby, John.
Attachment and Loss, Vol. I: Attachment.
New York: Basic Books, Inc., 1969.

9. Bowlby, John.
Attachment and Loss, Vol. II: Separation.
New York: Basic Books, Inc., 1973.
10. Braga and Braga.
Learning and Growing.
Englewood Cliffs, New Jersey: Prentice-Hall, 1975.
11. Briggs, Dorothy Corkville.
Your Child's Self-Esteem: The Key to His Life.
New York: Doubleday and Company, 1970.
12. Caldwell and Ricciuti.
Review of Child Development Research, Vol. 3.
Chicago: University of Chicago Press, 1973.
13. Child Care.
Newark, New Jersey: ROCOM, Division of Hoffman-LaRoche, Inc.,
1975.
14. Despert, Louise, M. D.
The Emotionally Disturbed Child: An Inquiry into Family Patterns.
Garden City, New York: Doubleday and Company, 1965.
15. Dinkmeyer, Don.
Child Development: The Emerging Self.
Chicago: Alfred Adler Institute, 1965.
16. Dinkmeyer, Don.
Raising a Responsible Child.
New York: Simon and Schuster, 1973.
17. Dodson, Fitzhugh.
How to Parent.
Seattle, Washington: Bookmarks, 1970.
18. Draper, M. Wanda and H. E. Draper.
Caring for Children.
Peoria, Illinois: Charles A. Bennett Company, 1975.
19. Elkind, David.
A Sympathetic Understanding of the Child: Birth to Sixteen.
Boston: Allyn and Bacon, Inc., 1974.

20. Gardner, George E., M. D., et al.
The Emerging Personality: Infancy Through Adolescence.
Los Angeles: Dell/Dial/Delacorte Press, 1970.
21. Ginott, Dr. Haim.
Between Parent and Child.
New York: Avon Books, 1965.
22. Hartup and Smothergill, eds.
The Young Child: Reviews of Research, Vol. I.
Washington, D. C: National Association for the Education of
Young Children, 1967.
23. Hartup, William, ed.
The Young Child: Reviews of Research, Vol. II.
Washington, D. C: National Association for the Education of
Young Children, 1972.
24. Hess, Robert D. and Doreen Croft.
Teachers of Young Children.
New York: Houghton Mifflin Company, 1972.
25. Horowitz.
Review of Child Development Research, Vol. 4.
Chicago: University of Chicago Press, 1973.
26. How Children Grow.
Washington, D. C: Day Care and Child Development Council of
America, 1972.
27. Hurlock, Elizabeth.
Child Development.
New York: McGraw-Hill, 1973.
28. Ingelman-Sundberg.
A Child is Born: The Drama of Life Before Birth.
New York: Dell Publishing Company, 1965.
29. Jackson, Edgar.
Telling a Child About Death.
New York: Hawthorn Books, Inc., 1965.
30. Knox, Eva.
The Beginning of Life: How Babies are Born.
New York: Crowell-Collier Press, 1969.

31. Leeper, Sarah, et al.
Good Schools for Young Children.
New York: Macmillan Publishing Company, 1974.
32. Liepmann, Lise.
Your Child's Sensory World.
New York: The Dial Press, 1973.
33. Mental Health: From Infancy Through Adolescence.
New York: Joint Commission on Mental Health of Children, 1973.
34. Montessori, Maria.
Secret of Childhood.
New York: Ballantine Books, Inc., 1966.
35. Muller, Phillipe.
The Tasks of Childhood.
New York: McGraw-Hill Paperbacks, 1969.
36. Mussen, et al.
Child Development and Personality.
New York: Harper and Row, 1974.
37. Papalia and Olds.
A Child's World: Infancy Through Adolescence.
New York: McGraw-Hill, 1975.
38. Phillips, John L. Jr.
The Origins of Intellect: Piaget's Theory.
San Francisco: W. H. Freeman and Company, 1975.
39. Piaget, Jean and Barbel Inhelder.
The Psychology of the Child.
New York: Basic Books, Inc., 1969.
40. Read, Katherine.
The Nursery School.
Philadelphia: W. B. Saunders Company, 1966.
41. Reilly, M.
Play as Exploratory Learning: Studies of Curiosity Behavior.
New York: Brunner/Mazel Publishers, 1974.
42. Salk, Dr. Lee.
Preparing for Parenthood.
New York: David McKay Company, 1974.

43. Sheppard, Dr. William.
Teaching Social Behavior to Young Children.
Champaign, Illinois: Research Press, 1973.
44. Shulman, Anne.
Absorbed in Living, Children Learn.
Washington, D. C: National Association for the Education of
Young Children, 1967.
45. Smart, Russell and Mollie Smart.
Infants: Development and Relationships.
New York: Macmillan Publishing Company, 1973.
46. Smart, Russell and Mollie Smart.
Preschool Children: Development and Relationships.
New York: Macmillan Publishing Company, 1973.
47. Turner, Eloise, et al.
Inside You and Me: A Child's Introduction to the Human Body.
New York: John Day Company, 1961.
48. White, Burton.
Experience and Environment.
Englewood Cliffs, New Jersey: Prentice-Hall, 1974.
49. Wolf, Anna.
Helping Your Child Understand Death.
New York: Child Study Association, 1973.

PAMPHLETS: MAJOR SOURCES

Abbey Press
St. Meinrad, Indiana 47577

1. Husbands and Pregnancy: The Handbook for Expectant Fathers.
Genne, William H.
\$1.00

Alaska Treatment Center for Crippled Children and Adults
3710 East 20th Avenue
Anchorage, Alaska 99504

2. Freddie Fetus.

American Association of Elem-K-Nursery Educators
1201 16th Street N. W.
Washington, D. C. 20036

3. Developing Mentally Healthy Children.
D'Evelyn, Katherine.

American Medical Association Health Education Materials
535 Dearborn Street
Chicago, Illinois 60610

4. What to do Before Your Baby Comes.
\$.20

Children's Bureau Publications
Superintendent of Documents
U. S. Government Printing Office
Washington, D. C. 20402

5. Child Development in the Home.
\$.45
6. A Creative Life for Your Children.
\$.35
7. Infant Care.
\$.20
8. Prenatal Care.
\$.75
9. When Your Baby is on the Way.
\$.15
10. Your Baby's First Year.
\$.15
11. Your Child from One to Six.
\$.20
12. Your Child from One to Three.
\$.20
13. Your Child from Three to Four.
\$.25

Gerber Products Company
Box 33
Fremont, Michigan 49412

14. Baby's Book.
15. How Does Your Baby Grow?

Green Giant Company
Box 50-458
LeSueur, Minnesota 56058

16. How to be Polite to Giants (and People).
\$.25

Johnson and Johnson
New Brunswick, New Jersey 08903

17. Baby's Eating and Sleeping Habits.
18. How a Baby Grows.

Maternity Center Association
48 East 92nd Street
New York, New York 10028

19. A Survey of Recent Medical Advances in Maternity Care.

National Association for the Education of Young Children
1834 Connecticut Avenue N. W.
Washington, D. C. 20036

20. The Significance of the Young Child's Motor Development.

The National Foundation/March of Dimes
Box 2000
White Plains, New York 10602

21. Be Good to Your Baby Before it is Born.
22. Tenga Buen Cuidado De Su Bebe Antes Que Nazca.

Office of Child Development
Department of Health, Education and Welfare
U. S. Government Printing Office
Washington, D. C. 20402

23. The Caring for Children Series.

- a. From "I" to "We."
#75-1033, \$.60
- b. The Individual Child.
#75-1032, \$.55
- c. More Than a Teacher.
#75-1027, \$.55
- d. Preparing for Change.
#75-1028, \$.60
- e. The Ways Children Learn.
#73-1026, \$.55

24. Mientras Su Bibe Esta En Camino.
\$.20

Patricia Menconi and Jeanne Steiger
2710 Kenross
Houston, Texas 77043

25. Volunteers' Perceptual Motor Manual.

Pocket Books
630 Fifth Avenue
New York, New York 10020

26. The Emotional Care of Your Child.
Abrahamsen, David, M. D.
\$.75

27. How to Raise an Emotionally Healthy Child.
\$.75

Public Affairs Committee
381 Park Avenue South
New York, New York 10016

\$.50 each

28. Enjoy Your Child - Ages One, Two and Three.
29. How to Discipline Your Child.
30. How to Teach Your Child About Work.
31. How to Tell Your Child About Sex.
32. Making the Grade as Dad.
33. Neuve Meses Para Prepararse: La Importancia Del Cuidado Prenatal.
34. The Shy Child.
35. Three to Six: Your Child Starts to School.
36. What Should Parents Expect from Children?
37. You and Your Child's School.
38. Your Child's Emotional Health.
39. Your Child's Friends.
40. Your Child's Sense of Responsibility.
41. Your New Baby.

Ross Laboratories
Columbus, Ohio 43216

42. Developing Toilet Habits.
43. How Your Child Learns About Sex.
44. The Phenomenon of Early Development.
45. Your Baby Becomes a Toddler.

46. Your Children's Quarrels.

47. Your Child's Fears.

Texas State Commission for the Blind
4800 North Lamar Boulevard
Austin, Texas 78756.

48. General Growth and Development Patterns for the Preschool Years.

49. To Encourage a Child to Walk.

AUDIO-VISUAL RESOURCES

FILMS

Contemporary Films
McGraw-Hill
1212 Avenue of the Americas
New York, New York 10019

1. The Fireman is Sad and Cries. Rental: \$12.50
Color, 10 minutes.
Insight into the world of children--their fantasies, fears and visions, as revealed through paintings.
2. Frustrating Fours and Fascinating Fives. Rental: \$15.00
B/W, 22 minutes.
An older film which focuses on the interpersonal and motor skills and on the sense of self of a boy as he grows from four to five.
3. Terrible Twos and Trusting Threes. Rental: \$12.00
B/W, 22 minutes.
An older film that shows development of children from two to three at home and in a nursery school.

Harper and Row
Educational Media Division
49 East 33rd Street
New York, New York 10016

4. Development of the Child: Cognition. Rental: \$30.00
Color, 29 minutes.
Developmental changes in perception, memory, evaluation and reasoning.

5. Development of the Child: Infancy. Rental: \$25.00
Color, 29 minutes.

Comprehensive study of an infant's
first eighteen months of development.

McGraw-Hill
324 West 42nd Street
New York, New York 10036

6. Development of Individual Differences. Rental: \$8.50
B/W, 13 minutes.

An introductory film on the effects of
heredity and environment.

Modern Talking Picture Service
1212 Avenue of the Americas
New York, New York 10036

7. Four Children. Free on loan
B/W, 20 minutes.

Four four-year-olds in a Head Start
program are observed at home and
school; differences in behavior and
development are observable.

NET: Bloomington
Indiana University
Audio-Visual Center
Bloomington, Indiana 47401

8. The Conscience of a Child. Rental: \$7.80
B/W, 29 minutes.

Recent techniques involved in the
study of growth and development
of personality in children.

New York University Film Library
26 Washington Place
New York, New York 10003

9. Fears of Children. Rental: \$9.50
B/W, 30 minutes.
A good older film about a child coping with a series of fears.
10. How Babies Learn. Rental: \$15.00
Color, 35 minutes.
Influences of the mother-child relationship and important developmental achievements of the first year of life.
11. Life With Baby. Rental: \$7.00
B/W, 18 minutes.
Depicts developmental processes as infants grow through their sixth year; deals with work of Arnold Gesell.
12. Nursery School-Child-Mother Interactions. Rental: \$18.00
B/W, 41 minutes.
Three Head Start children and their mothers. Shows three mothers and their attitudes and behaviors toward their four-year-olds at home, and how this affects their children's school behavior.
13. A Study of Maternal Attitudes. Rental: \$12.50
B/W, 30 minutes.
Investigates the effects of the mother on the development of the child. Several situations are presented: thumbsucking, in-laws, sibling rivalry, relief of tension, interview situations.
14. The World of Three. Rental: \$11.50
B/W, 28 minutes.
The home as it appears to the child who is on the receiving end of "child training." Includes a new baby and sibling rivalry.

Oklahoma State Department of Health
N. E. 10th and Stonewall
Oklahoma City, Oklahoma 73105
Attn: Film Library

Free on loan

15. Have a Healthy Baby.

Color, 19 minutes.

This animated film shows the important stages of growth of the human embryo from conception to birth, with discussion of the role of good nutrition and health habits.

16. Heredity and Prenatal Environment.

B/W, 21 minutes.

Shows union of male and female sex cells. Explains chromosomes and genes in determining sex and in transmitting mental and physical characteristics to offspring.

17. Life With Baby.

B/W, 18 minutes.

Mental and physical development of young children under direction of Dr. Arnold Gesell.

18. Nine Months to Get Ready.

Color, 25 minutes.

Shows the importance of prenatal care in the developmental process.

19. Parents are Teachers, Too.

B/W, 15 minutes.

Shows how parents can help their preschool child learn.

Vassar Film Program
Department of Psychology
Vassar College
Poughkeepsie, New York 12601

20. Frustration Play Techniques.

Rental: \$8.00

B/W, 35 minutes.

Deals with how the child encounters and
deals with frustration.

FILMSTRIPS

Maternity Center Association
48 East 92nd Street
New York, New York 10028

1. Birth Atlas Slide Series. Series Price: \$10.50
Includes slides and script booklet.

National Education Association
1201 16th Street, N. W.
Washington, D. C. 20036

2. Helping Your Child Grow Up. Price: \$18.00
Includes filmstrip and cassette.
3. Motivation in Teaching and Learning. Price: \$10.00
Includes filmstrip and record.

National Foundation/March of Dimes
1275 Mamaroneck Avenue
White Plains, New York 10605

4. Straight Talk About Pregnancy and Price: \$15.00
Prenatal Care.
Includes slides, booklets, cassettes.

Parents' Magazine Films, Inc.
52 Vanderbilt Avenue
New York, New York 10017

5. The Development of Feelings in Children. Series Price: \$55.00
Includes filmstrips, cassettes or records.
6. Prenatal Care: Preparing for Parenthood. Series Price: \$55.00
Includes filmstrip series, cassettes or records.

CASSETTE TAPES

Child Care Information Center
532 Settlers Landing Road
P. O. Box 548
Hampton, Virginia 23669

When ordering, give tape number, title and author.

1. Cognition and Play. \$2.50
Frost, Joe.
95-23
Discusses the importance of play as
an avenue for cognitive development.
2. The Comparative Study of Mother-
Infant Relationships. \$2.50
Hinde, Robert.
91-03
3. Developing Comprehensive Child
Development Programs. \$2.50
Nimicht, Glen.
90-80
The question is not whether additional
programs for the education of young
children are needed, but whether these
programs should be restricted to child
development institutions. Advances
theory that perhaps parents could be
trained to provide a background education
in the home environment.
4. Developing Thought and Language. \$2.50
Barber, Dr. Adeline.
95-11
Discusses how oral language develops,
and provides the base for written
language.

5. The Development of Altruistic Motives. \$1.25
Hoffman, Martin.
91-01-A
6. Early Childhood Research: Second \$2.50
Thoughts and Next Steps.
Almy, Millie.
90-62
Presents past accomplishments of research in early childhood education, and discusses possibilities for the future.
7. Love, Belongingness, Self-Respect \$2.50
and Self-Esteem.
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